Bulletin 6.0009.1

noise control

INDUSTRIAL ACOUSTICS COMPANY
a digest of industry's broadest line

THE STANDARD OF SILENCE

NOISE CONTROL SYSTEMS

iac Engineered products for positive noise control

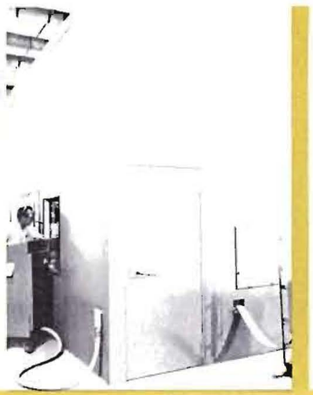
• OSHA • HEARING CONSERVATION • SPEECH COMMUNICATION • COMMUNITY NOISE • RESEARCH • QUALITY CONTROL • TESTING

"Do-It-Yourself" Noise-Control Components.

IAC Moduline®. "Do-it-yourself" noise-control structures with pre-engineered laboratory-rated and field-tested components: wall, floor, and ceiling panels, doors, windows, joiners, connectors, and ventilation systems.

Applications include: Machinery enclosures, sound barriers and partitions, mechanical equipment rooms, compressors, cooling tower and pump housings, and partial enclosures.

Request Bulletin 6.0501.3

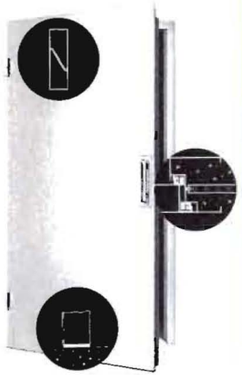


IAC Noise-Lock® Doors. High transmission loss characteristics — gravity hinges and magnetic/compression seals.

IAC Noise-Lock® Windows. Acoustically rated in single- and double-glazed designs.

Applications include: Equipment rooms, offices, sound-barrier walls and partitions, machinery enclosures, laboratories, conference rooms, and studios.

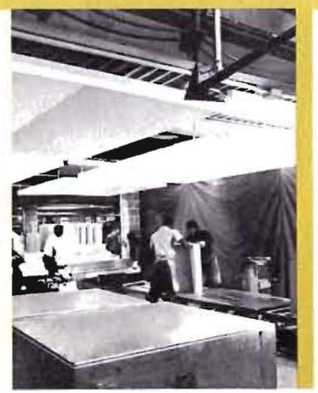
Request Bulletin 6.1101.1



IAC Noise-Foil® Sound-Absorption Systems. Reduce reverberant noise build-up and provide sound-path noise reduction.

Applications include: Fan and equipment rooms, production/manufacturing areas, foundries, processing plants, textile mills, and engine test cells.

Request Bulletin 6.0510.2



Offices, Buildings, Other Acoustic Structures.

IAC Modular Structures, Offices, and Buildings. For acoustically and climatically controlled environments of any size. Can be demounted, expanded, or rearranged without loss of acoustical performance.

Applications include: Supervisory offices, control rooms, plant office areas and suites, work stations, power-plant offices, rest areas and canteens.

Request Bulletin 6.0502.2

IAC Portable Sound Shelters. Ready-to-use rooms movable with forklift or crane. Complete with lights, electrical, and ventilation systems. Ruggedly engineered. Acoustical lab ratings and field test data. 16 standard sizes.

Applications include: Factory offices for supervisors, foremen, nurses, clerical personnel. Machine tender stations, monitor booths, cool-off rooms, quiet havens, and in-plant conference areas.

Request Bulletin 6.0106.6

IAC Audiometric Testing Rooms. "Mini" and regular-sized rooms available in three acoustical performance ratings for ambient noise level locations of approximately 70, 80, and over 100 dB-A. Certified to meet OSHA and state-required ANSI standards.

Applications include: Clinics, in-plant areas, and trailers for pre-placement, on-the-job screening and diagnostic hearing tests.

Request Bulletin 5.0701.1

Research, Testing, Quality-Control Rooms.

IAC Anechoic Chambers — Echo-free or "dead" rooms permit accurate free-field measurements for product research/development and testing.

Applications include: Laboratory and quality-control programs for engines, transformers, appliances, office machines, audio equipment, and noisy machinery.

Request Bulletin 6.0903.0

IAC Reverberant Rooms. "Hard" or "live" nonabsorptive rooms for testing and development of products requiring accurate diffuse field measurements, decay rates, and sound power level ratings. Designed to meet IEEE, ASHRAE, ASTM, and other test standards.

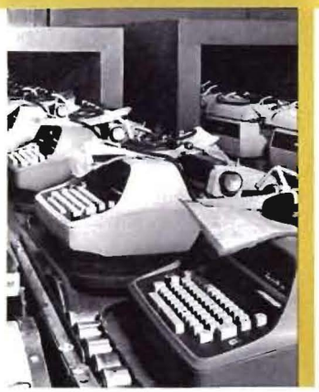
Applications include: Laboratory and quality-control programs for appliances, electric motors, acoustic properties of materials, fatigue testing, air-moving equipment, engines, and machinery.

Request Bulletin 6.1002.0

IAC Sound-Isolation Rooms. Semianechoic or "quiet" rooms in single- and multiple-wall design for product development, testing, and quality control.

Applications include: In- and off-line product test rooms, shake table enclosures, laboratory rooms, cubicles and carrels.

Request Bulletin 6.0001.0

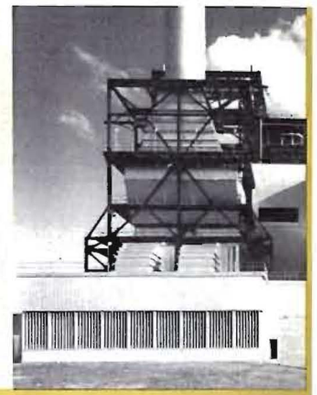


Gas/Air-Flow Silencing Systems.

IAC Power-Flow Silencers. For heavy-duty gas/air-handling equipment. Large variety of ruggedly designed rectangular and circular cross sections. Laboratory acoustic and pressure drop ratings plus field test data. Corrosion- and heat-resistant designs available.

Applications include: Mechanical draft fans, gas turbines, diesel engines, total energy systems, cooling towers, wind tunnels, dust collectors, and equipment rooms.

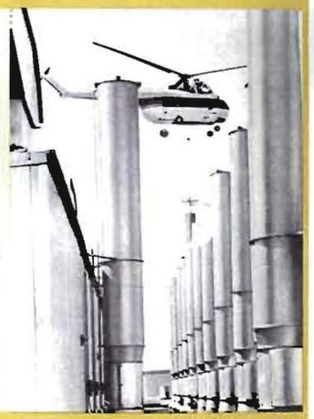
Request Bulletin 4.0501.0



IAC Quiet-Flow Insert Silencers. Available in Conic-Flow cylindrical and Power-Flow splitter configurations for existing or proposed inlet and exhaust air/gas-flow systems to meet noise-exposure and neighborhood acoustic criteria.

Applications include: Chimneys, flues, and ventilation systems. Paint booth stacks, sintering, power, steel, and chemical plants.

Request Bulletin 6.0507.0



Air-Handling Silencers. Noishield® louvers, air-transfer and duct silencers. Available in large variety of cross sections. Rated aerodynamically and acoustically.

Applications include: Air intakes, exhaust systems, equipment screens, cooling towers, mechanical equipment rooms, and machinery enclosures.

Request Bulletin 1.0001.2

a digest of data from IAC

This folder is intended as a general guide to IAC engineered noise-control products designed to meet OSHA and other noise-exposure standards. It is based on a unique reservoir of know-how and experience gained in thousands of IAC installations since 1949. The products are backed by extensive acoustic laboratory and manufacturing facilities. They are described and illustrated in detail in twelve product bulletins which are summarized here.

To obtain the bulletin of interest simply call or write to IAC and we will also mail to you some applicable noise-control case histories in our "Here's How" series, each of which discusses **a problem,** its **solution,** and **results** achieved.

If none of the products shown appears to apply to your particular situation, describe your noise problem and we will be happy to supply additional data, suggest solutions, or have a representative contact you.

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A BRIEF GLANCE AT IAC DEPARTMENTS & PRODUCTS

Rooms & Enclosures for:
Factory Offices
Machine Monitor Stations
Quiet Havens
Noisy Machinery
Sound Absorption Systems
Acoustic Research
Quality Control
Anechoic and Reverberant Environments

Movable Acoustical Trackwalls
Acoustic Doors and Partitions
Modular Soundproof Rooms
Language/Study Carrels
Music Practice Rooms

Acoustic/R.F. Shielded Rooms:
Industrial Hearing Conservation
Audiometric Examination
Experimental Psychology
Heart Auscultation
Pharmacology
Cardiography
Electro Physiology

Aerospace Silencing Systems for:
Jet Aircraft Ground Run-Ups
Jet, Turbo-Prop, and Propeller Test Stands
Rocket Test Stands
Helicopters
Aircraft Cabins
Instrumentation Vans

Industrial Silencing Systems for:
Mechanical Draft Fans
Gas Turbines & Diesel Engines
Steam Ejectors
Vacuum Pumps
Air Compressors

Quiet-DUCT Silencers
Conic-FLOW Silencers
Quiet-VENT Silencers
Quiet-FLOW Fan Plenums
Noishield Louvers

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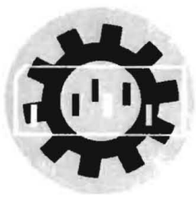
4055 Niederkrüchten, Germany · Phone (02163) 50 38, 50 39 · Telex 852261
REPRESENTATIVES IN PRINCIPAL CITIES

Printed in U.S.A.

IAC BULLETIN
NO. 6.1220.0

Thousands of books are annually put on tape by Recording for the Blind, Inc. This article describes some of the acoustical rooms devised and used for this specialized requirement.

A Voice for the Sightless



Reprint of an article which appeared in

db THE SOUND ENGINEERING MAGAZINE

iac
THE STANDARD OF SILENCE

A Voice for the Sightless

Thousands of books are annually put on tape by Recording for the Blind Inc. This article describes some of the acoustical rooms devised and used for this specialized requirement.

THE COLLEGE STUDENT slipped his newest cassette into his tape recorder and settled back to listen. "Paren a plus b close paren" came over the tape in a clear, careful voice. No, these weren't the words to a new hard rock song, perhaps directed against the authority figures, Mom and Pop. The student was one of the 10,000 blind high school students and 3,000 college students who must depend upon tape recordings to "read" their textbooks. The subject was mathematics. With the aid of his tape recorder and his knowledge of braille, the student was able to keep up with his class. More important, he was able to participate fully in an education that would enable him to use his talents as a self-sustaining and contributing member of society.

A large number of the talking books used by the blind are produced by Recording for the Blind, Inc. which coordinates the services of 4,000 trained volunteers who work at twenty-five professionally-equipped taping centers in fifteen states. Recording is always an exacting and frequently an extremely challenging mental task. Foreign languages and classical subjects have to be read authoritatively, and scientific and mathematical books must be articulated so that the complex meaning of their phraseology imprints itself comprehensively upon the blind listener's memory. Taping is a team effort. The reader works in concert with a monitor who, using a second copy of the book being recorded, simultaneously proofreads the transcription. The monitor also operates the recorder, taping on a seven-inch two-track reel at 3¾ in./sec. correcting mispronunciations and errors in phrasing and maintaining good sound quality.

In order to produce the enormous quantity of literature needed by the blind with consistent high quality, a good deal of attention has been paid to the design of the sound cubicles in which the recordings are made, produced by Industrial Acoustics Co. with exacting specifications aimed at maintaining a finely controlled acoustical environment as well as an atmosphere devised to produce maximum comfort, alertness, and efficiency for the recorders.

Figure 1. A person outside the Industrial Acoustics Company chamber acting as a monitor operates the recorder, adjusting sound quality and doing proof reading at the same time.

In the New York studio, eleven IAC rooms are situated back-to-back or set up individually as dictated by arrangement of the studio. They are of different sizes, constructed with roof and wall panels whose interior side is a sheet of 22-gauge cold-rolled perforated steel and whose outside face is a solid sheet of 16-gauge cold-rolled steel. In the middle of this metallic sandwich is an acoustical, sound-absorbing and sound-retarding fill which is mildew-resistant, incombustible, inert, and verminproof. Welding and riveting the face sheet to the panel assembly holds this filler in place. All panels are four inches thick and are joined acoustically and structurally with one-piece

(Concluded on next page)

Figure 2. A typical Industrial Acoustics sound-proof chamber.

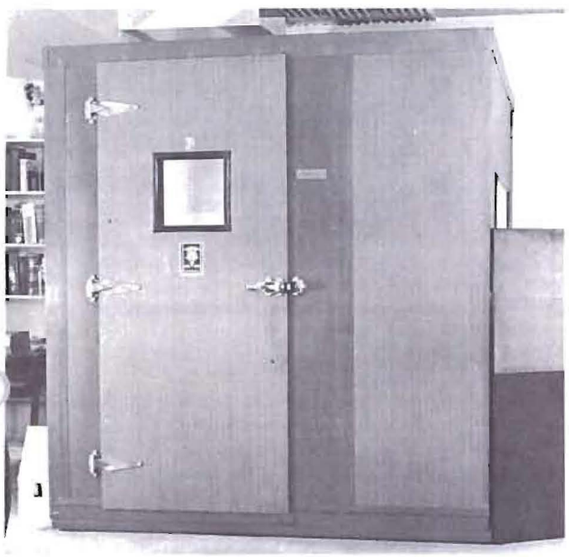


Figure 3. Another view of the chamber, showing the clear communication between the reader and the monitor.

Figure 4. The chamber's doors have double acoustical seals.

Figure 5. Tape books are kept in this library for speedy delivery as needed.

"H" members constructed so that there is no noise through panel seams. Panels making up the floors rest on properly loaded vibration-isolator rails providing a natural frequency of less than 7 Hz.

The well-lighted rooms are outfitted with a silenced ventilation system, either a discharge silencer in a roof panel acting as an intake and exhaust silencer, or a forced-ventilation system guaranteed to be below the binaural M.A.F. zero degree azimuth threshold of hearing.

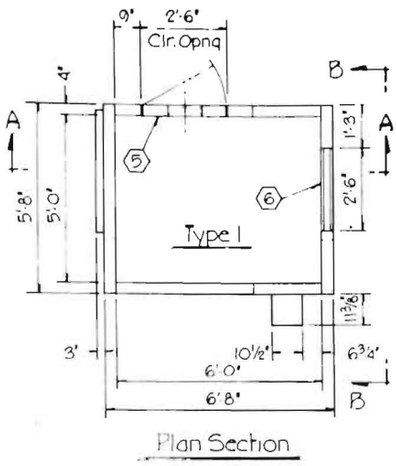
For visual communication between reader and monitor during tapings, each room has a window, 24 x 30 inches or larger, made of two layers of quarter-inch safety glass separated by an air space and sealed in acoustically tight rubber seals. The air space contains a dessicant material to prevent misting.

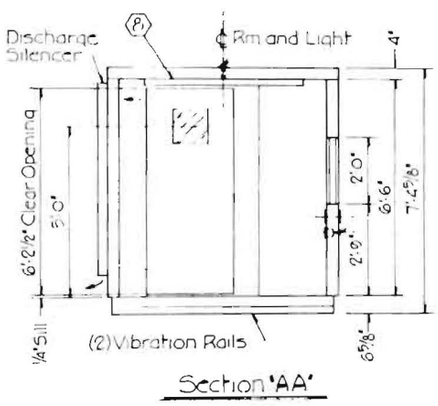
The three and a half inch thick, clear-opening, soundproof door is thirty inches wide and 74½ inches high, with double acoustic seals. Each door has a foot-square window and is equipped with architecturally heavy-duty butt hinges and an integrally mounted latch mechanism. Testing has indicated that these chambers have a certified rating of forty-two decibels in the speech-interference range.

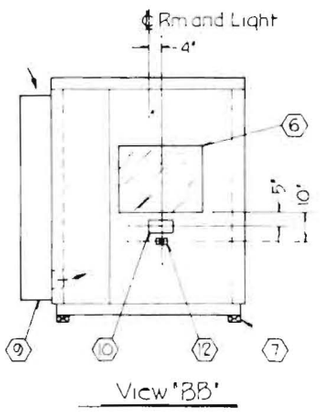
As many as four thousand books a year are put on tape in these chambers, offering a valuable service in improving the quality of life for the blind. Incidentally, the painstaking attention to excellence which the engineering of the sound chambers provides has devised a set-up which can be useful in any situation where exact recording conditions are a must.

Figure 6. Master tapes of each recorded title are duplicated as requests for books are received.

Construction Details of IAC Schedule 40
Tape Recording Sound Isolation Room — Model 65







GENERAL NOTES:

1. TOTAL ESTIMATED DESIGN WEIGHT — 2,350 pounds
2. PAINT FINISH — Note alternates (Check one)

	☐ A	☐ B	☐ C
Interior	Sun Yellow	Light Blue	Light Green
Exterior	Sandalwood	Med. Beige	Med. Grey

3. LARGEST SIZE PANELS: 48" w x 78" H x 4" thick
4. ELECTRICAL: All conduits, KO boxes, switches, ballast box, wires and wiring, not by IAC
5. DOOR:
   (a) IAC 30"W x 74½"H clear opening with 12"W x 12"H double glazed window
   (b) Doors for type No. 1 thru 8 may be hinged left or right
   (c) Opposite door for room types 9 thru 20 will cause interference with V-100 silencer
6. WINDOW: IAC 30"W x 24"H double glazed in wall
7. (2) Vibration rails, each loaded for 1,175 pounds
8. LIGHT FIXTURE: (1) Mercury, No. M 106.240RS fluorescent lamp with plastic cover. Flourescent light ballasts are to be removed and wired remotely
9. BLOWER CHARACTERISTICS: 115 volts — single phase; 60 cycles — 24 watts each; V-100 blower silences
10. Audiometric jack panel consists of the following:
    Interior: (4) Switchcraft 12B Jax; (1) Cannon Conn. No. XLR 3-13N
    Exterior: (4) Switchcraft 12B Jax; (1) Cannon Conn. No. XLR 3-14N
11. Customer must assemble room on a flat and level floor area (± 1/4" in 10' non cumulative)
12. Recessed duplex receptacle is rated for 15A, 115V, 60 cycles

Refer to Bulletin 6.0130.0 (45/65) for details on 40 different types of Tape Recording Rooms (Models 45 and 65)

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INDUSTRIAL ACOUSTICS COMPANY

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YOUR IAC TECH REP IS

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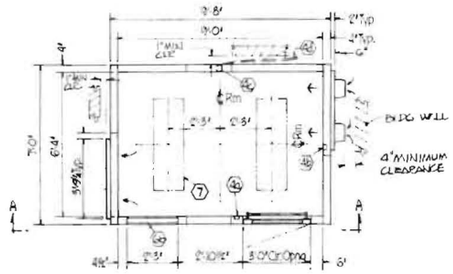
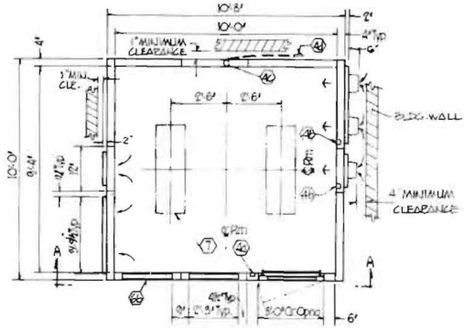
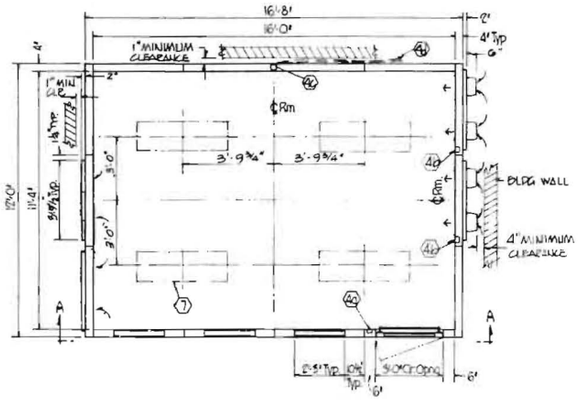


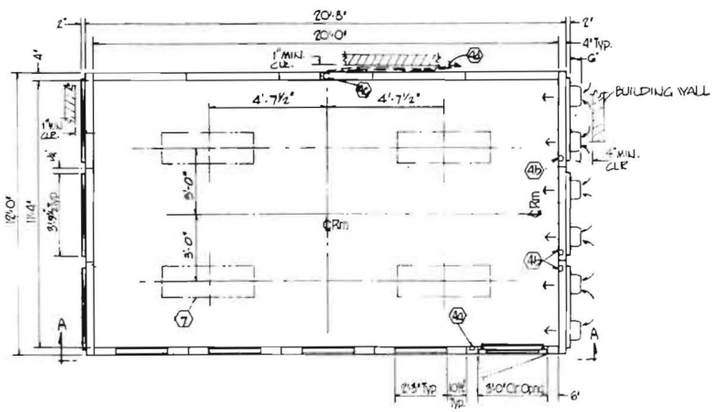
PLAN SECTION – TRIO MODEL



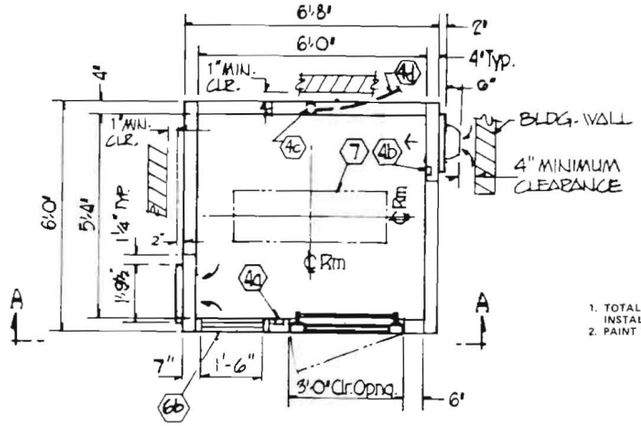
PLAN SECTION – QUARTET MODEL



PLAN SECTION
QUINTET MODEL

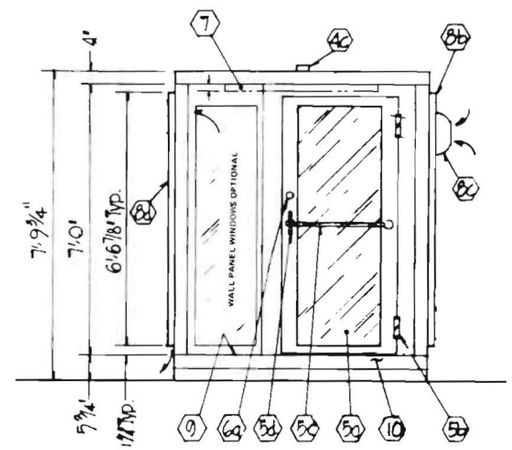


PLAN SECTION
SEXTET MODEL



PLAN SECTION

DUET MODEL



ELEVATION "AA"

GENERAL NOTES

1. TOTAL INSTALLED WEIGHT. 2300 lb
2. PAINT FINISH: SELECT INSIDE AND OUTSIDE COLORS FROM STANDARD IAC PAINT FINISHES. INDICATE (I) FOR INSIDE COLOR, (O) FOR OUTSIDE COLOR ONLY CEILING AVAILABLE IN WHITE.
   ( ) MEDIUM GREEN ( ) BEIGE
   ( ) MEDIUM GREY ( ) LIGHT GREY
   ( ) LIGHT BLUE ( ) LIGHT GREEN
   ( ) BRONZE GOLD ( ) WHITE CEILING.
   CEILING WILL BE INSIDE COLOR UNLESS WHITE CEILING CHECKED.
3. LARGEST PANEL: 48 in. W x 84 in. L x 6 in. THICK. CUSTOMER TO VERIFY ALL MATERIALS CAN BE BROUGHT TO ROOM LOCATION.
4. ELECTRICAL:
   (a) ONE (1) FLUSH MOUNTED LIGHTED TOGGLE SWITCH CONTROLLING VENTILATION AND LIGHTING SYSTEM. CENTERLINE OF SWITCH TO BE 4 ft - 0 in. ABOVE IAC FLOOR.
   (b) (1) FLUSH MOUNTED DUPLEX RECEPTACLE RATED FOR 15 amp, 115 v, 60 Hz. CENTERLINE OF RECEPTACLE TO BE 1 ft - 6 in. ABOVE IAC FLOOR.
   (c) ALL WIRING TO BE WITHIN PANELS AND TERMINATE AT CENTRAL JUNCTION BOX. JUNCTION BOX MUST BE ACCESSIBLE FROM TOP OR SIDE OF ROOM.
   (d) ROOM TO BE EQUIPPED WITH HUBBELL MODEL No. 7311 TWIST LOCK PLUG ON 12 ft CORD. CUSTOMER TO SUPPLY COMPATIBLE SOCKET.
5. DOOR:
   (a) 36 in. W x 79-1/2 in. H CLEAR OPENING. LEAF 2 1/2 in. THICK WITH 27 in. W x 74 1/2 in. H x 1/4 in. THICK DOUBLE GLAZED SAFETY GLASS WINDOW.
   (b) CAM LIFT HINGES, TWO PER LEAF WITH US 26D FINISH.
   (c) PUSH PULL BAR SHALL BE INSIDE OF ROOM AND BE FULL WIDTH OF DOOR AND HAVE US 26D FINISH.
   (d) PULL HANDLE MOUNTED ON OUTSIDE OF DOOR TO HAVE US 26D FINISH.
6. OPTIONAL ITEMS:
   (a) DEADLOCK AVAILABLE, LOCATED 50 in. ABOVE BUILDING FLOOR.
   (b) DOUBLE GLAZED 1/4 in. THICK SAFETY GLASS WINDOW(S) MOUNTED IN WALL PANEL(S) AVAILABLE. SIZE – 18 in. W x 74 1/2 in. H.
   (c) TRIM FINISHED IN COMPLEMENTARY COLORS.
7. LIGHT FIXTURE: (1) WITH (4) 40 w FLUORESCENT LAMPS AND ACRYLIC PRISMATIC LENS.
8. VENTILATION
   (a) TOTAL AIR EXCHANGE CAPACITY 175 cfm. FAN ELECTRICAL CHARACTERISTICS–115 v, 60 Hz, 40 w EACH. TOTAL: 40 w.
   (b) INTAKE PANEL SILENCER SYSTEM
   (c) INTAKE FAN SILENCER.
   (d) EXHAUST PANEL SILENCER SYSTEM.
9. FLOOR COVERING. CONTINUOUS FILAMENT NYLON PILE CARPET SELECT COORDINATED COLORS:
   ( ) HARLEQUIN GREEN ( ) NASSAU BLUE
   ( ) SENORA RED ( ) LACQUER GOLD
   ( ) SILVERWOOD GREY
10. FLOOR PANELS: EACH FLOOR PANEL PROVIDED WITH INTEGRAL VIBRATION ISOLATORS RATED FOR NATURAL FREQUENCY OF 6-1/4 Hz.
11. CUSTOMER TO PROVIDE A FLAT AND LEVEL AREA (± 1/4 in. IN 10 ft NON-CUMULATIVE)

INDUSTRIAL ACOUSTICS COMPANY, INC.
1160 COMMERCE AVE., BRONX, N. Y. 10462

IAC STANDARD PRODUCT LINE
MUSIC PRACTICE ROOMS
5 MODELS

BULLETIN 6.0124.0 (1)

THE STANDARD OF SILENCE

EXCLUSIVE
ACOUSTICAL TEST REPORTS
on
INDUSTRIAL ACOUSTICS COMPANY
MUSIC PRACTICE ROOMS

INDUSTRIAL ACOUSTICS COMPANY, INC.

BULLETIN 3.0201.0
Supersedes 6.0120.1
INDUSTRIAL ACOUSTICS COMPANY

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THE STANDARD OF SILENCE

CONCERT SERIES
music PRACTICE ROOMS

MODULAR CONTROLLED ACOUSTICAL ENVIRONMENT SYSTEMS

• MUSIC PRACTICE • TAPE RECORDING • STUDIO • RESEARCH • CONTROL ROOM

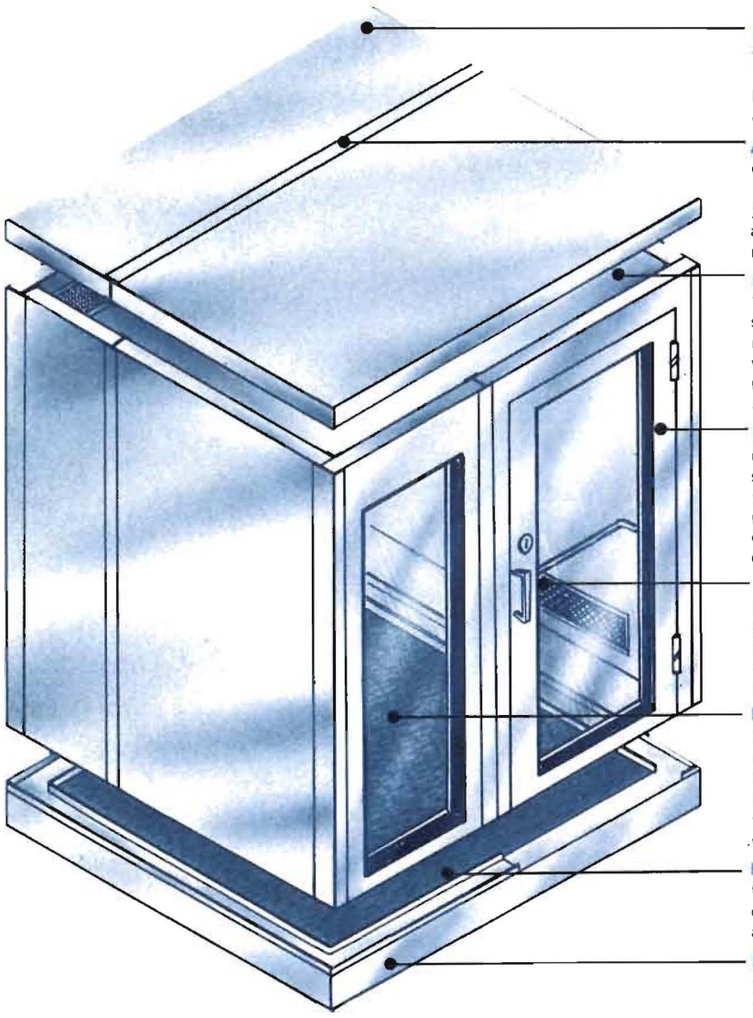
about IAC music practice rooms

Industrial Acoustics Company's Concert Series Music Practice Rooms which combine a high degree of noise isolation and a controllable acoustic environment with a pleasing and comfortable atmosphere are responsive to the needs of the most demanding artist, beginning student, or music instructor.

Available in a variety of sizes and acoustic designs, the MPRs provide the sound transmission loss and sound absorption to create the environment best suited to a particular instrument or vocal requirement. Responsiveness and reverberation time can be varied with the application of IAC's new Vari-tone plaques. Particular attention has been paid to the Tranquil-Aire ventilation and silencer system to provide a quiet air supply. Unusual site conditions and special or extended sizes can be readily accommodated with the economical Moduline component system. IAC Concert Series Music Practice Rooms are available in five standard sizes – Duet, Trio, Quartet, Quintet, and Sextet Models – and can be specified with confidence that both student and instructor needs will be satisfied.

ALL ROOMS READILY RELOCATED AND CHANGED IN SIZE

STANDARD FEATURES



EXPLODED VIEW –
IAC CONCERT SERIES MUSIC PRACTICE ROOM – DUET MODEL

MODULINE PANELS – Rugged welded all steel 4 in. thick Noishield® panels provide high transmission loss. Readily dismantled for relocation or expansion with no loss in acoustic performance. Field proven on thousands of quality noise control installations.

ACOUSTIC JOINERS – Noise tightness at all joining and connecting conditions is paramount for good noise reduction. IAC's unique trouble free, sound absorbing labyrinth joiners assure compatibility between all room components and prevent alignment problems associated with flimsy non-absorptive linkage designs. Not all details shown.

SOUND CONTROL – Modular design allows intermix of "hard" or sound reflective panels and "soft" or sound absorptive panels. These combinations allow "liveness" or reverberation time of the room to be controlled to provide an environment for the required room function. The reverberation time can be further controlled by adding or adjusting IAC Vari-tone™ plaques.

NOISE-LOCK DOOR – Positive head and jamb double magnetic and sound absorbing labyrinth seals. Compression action of cam-hinge provides tight floor seal eliminating hazardous sills and unreliable threshold closures. Lab rated at STC 47, the latch free magnetic Noise-Lock® door provides fail safe entrance and exit, trouble free operation and consistent high performance.

VENTILATION – Tranquil-Aire® silenced ventilation system is built into each module. Provides a very quiet and comfortable 30 air changes per hour at $<$NC-20 for Duets and Trios and $<$ NC-25 for larger rooms. The system can be connected to a central ventilation system. Fans accessable from inside room.

NOISE-LOCK WINDOW – Laboratory developed and field tested, double glazed acoustic window achieves compatible performance with panel modules. Available with optional privacy blinds and in economical Noishield single glazed units when lower noise reduction can be tolerated. Window is standard in door leaf and optional in wall panel.

DECORATION – Abuse resistant enamel paint finish and floor carpet in a variety of coordinated colors. Optional decorator design finishes such as vinyl and wall carpet are also available.

FLOOR – Acousti-Flote™ floor provides superior noise reduction and prevents passage of structural-borne noise. Natural frequency of standard vibration isolation system is 6¼ Hz. Alternate systems available to solve unusual vibration problems.

About Industrial Acoustics Company

Since 1949, IAC has pioneered in the design and manufacture of noise-control and sound-conditioning equipment. The experience gained in tens of thousands of sound-isolation-room installations has been utilized in the design and fabrication of the Concert Series Music Practice Rooms.

IAC's unique aeroacoustic laboratory has developed standard and custom-engineered products for a great variety of medical, aerospace, industrial, and architectural applications. These range from anechoic chambers, reverberant rooms, and recording studios to acoustic movable walls, noise control systems for machinery enclosures and air conditioning, gas turbine, and jet engine silencers.

Acoustical Performance - IAC Music Practice Rooms

NOISE ISOLATION CLASS (NIC)

OCTAVE BAND CENTER FREQUENCIES, Hz	NOISE REDUCTION (NR - DECIBELS (dB))								NOISE ISOLATION CLASS (NIC)
	63	125	250	500	1000	2000	4000	8000	
STANDARD ROOM (OUT TO IN) lab test	24	26	28	39	47	53	55	55	43
(OUT TO IN) field test	–	26	34	46	53	60	65	–	47
ROOM TO ROOM 12" separation - lab test	35	38	51	77	96	103	>93	>93	62
12" spearation - field test	–	42	51	73	78	95	93	–	65

The above noise reduction measurements are based upon ASTM E336–71 test procedure. Certified laboratory and field test reports conducted by independent acoustical consultants available upon request.

The Noise Isolation Class (NIC) performance at left reports the results of certified laboratory and field tests on fully assembled standard IAC Music Practice Rooms. This superior performance can be further improved by specifying Noise-Lock or Super-Noise-Lock panel construction.

Moduline acoustical panel, door, window and ventilation system components are used extensively for walls and custom made soundproof rooms interfacing with existing walls and ceilings. Moduline Sound Transmission Loss and Absorption data are reported below for such purposes.

TRANSMISSION LOSS IN DECIBELS

OCTAVE BAND CENTER FREQUENCIES, Hz	63	125	250	500	1000	2000	4000	8000	STC
Noishield	26	23	30	42	51	59	58	>58	41
Noise-Lock	30	28	34	40	48	56	62	>62	42
Super Noise-Lock	–	30.5	37	47.5	54.5	56.5	55	>55	50

The above transmission measurements are based upon ASTM E90-61 T test procedure. Certified laboratory test reports available upon request.

SOUND ABSORPTION CHARACTERISTICS

OCTAVE BAND CENTER FREQUENCIES, Hz	125	250	500	1000	2000	4000	8000	NRC
Absorption Coefficients Noishield Panels	0.89	1.20	1.16	1.09	1.01	1.03	0.93	(1.10) 0.95

The above absorption measurements are based upon ASTM C423-65 test procedure. Certified laboratory test reports available upon request.

MEASURED REVERBERATION TIME, SECONDS

1/3 OCTAVE BAND CENTER FREQUENCIES, Hz	125	250	500	1000	2000	4000	AVERAGE
STANDARD DUET MODEL without Vari-tone Plaques	0.141	0.195	0.179	0.163	0.241	0.236	0.193
STANDARD DUET MODEL 21 sq ft of perforated area covered with Vari-tone Plaques	0.169	0.199	0.189	0.179	0.273	0.322	0.222
STANDARD DUET MODEL all perforated areas covered with Vari-tone Plaques	0.444	0.469	0.739	0.801	0.960	1.091	0.751

The measured reverberation times reported at right are determined by the relationship of sound reflective and absorptive surface areas and room volume. The acoustic response of the interior surfaces should be predetermined and specified prior to installation to produce the desired reverberation time. For flexibility, reflective or absorptive IAC Vari-tone™ plaques can be added after installation so that the acoustic response of the room can be changed to suit individual needs.

All of the above data was recorded on magnetic tape utilizing pink noise source and computed on graphic level recorder following ASTM C423-66 procedure.

Suggested Specifications

SCOPE:
Music practice rooms shall be IAC Concert Series in size(s) shown on drawings as manufactured by Industrial Acoustics Company and represented by (insert name and address of local IAC representative).

MATERIALS:

1. **Panels** for walls and ceilings shall be 4 in. thick IAC Noishield® panels constructed from inner and outer steel skins welded to a steel frame damped and filled with incombustible, inert, mildew-resistant and vermin-proof acoustical elements. Solid panel surfaces to be 16 gage steel. Inner perforated surfaces shall be 22 gage steel backed by acoustical fill spacer. Fabricated panel shall form a rugged, abuse-resistant and load bearing unit.
2. **Panel joiners** and connectors shall be steel, formed to structurally unite and acoustically seal all panel joining conditions such that an acoustic sound absorbing labyrinth is formed. Cam-locks and other unreliable mechanical fasteners shall not be permitted. Caulking not required.
3. **Floor** shall be 4 in. thick IAC Acousti-Flote™ consisting of 11 gage steel inner surface and 16 gage steel outer surface welded to a rugged steel frame. Floor assembly shall rest upon vibration isolation system rated for natural frequency of 6.25 Hz. Floor shall be capable of supporting a total load of 300 lb/sq ft. (Heavier loads and point loading can be accommodated upon request).
4. **Door** shall be 2½ in. thick IAC Noise-Lock® design utilizing cam-lift hinges and double magnetic seals with clear opening of 36 in. X 80 in. factory hung and adjusted in panel frame.
   a. **Acoustic Seals**- Jamb and head of the door and frame shall receive two sets of self-aligning magnetic compression seals. Door to be held in closed position by magnetic force of perimeter seals. No latch is required. Sound absorbing acoustic labyrinth shall be created when the door is in a closed position. Bottom of door leaf shall contain a continuous seal which shall compress against floor as the door is closed. Raised sills and threshold drop seals will not be permitted.

Suggested Specifications (cont'd)

b. Hinges- Door shall be furnished with two (2) IAC cam-lift butt-type hinges with US 26-D satin chrome finish. Hinges of an identical design shall have met test requirement of cycling a minimum of 125,000 times while supporting door leaf of 500 lb. (MPR door—200 lb).

c. Security Lock- Latch shall not be required to hold door closed or to achieve acoustic seal. Dead lock with US 26-D satin chrome finish can be provided as an option.

d. Push-Pull Handle and Bar- Full width inside push-pull bar and outside pull handles shall be provided with each door leaf.

e. Acoustic Performance- Manufacturer shall furnish laboratory test data (ASTM E90-70) indicating sound transmission class rating for operable door of STC 47.

5. **Double-glazed safety glass** windows shall be IAC Noise-Lock® design with clear area of 24 in. x 75 in. located in the door leaf and/or wall panels as shown on drawings.

6. **Ventilation System** shall be IAC Tranquil-Aire® design with built-in exhaust and inlet silencer panels. Inlet panel(s) shall contain fan system capable of providing a minimum of 30 air changes per hour for room(s) shown on drawings. OPTION – Ventilation system shall be capable of being coupled to building central ventilation system utilizing IAC Quiet-Duct® silencers to prevent cross-flanking and quiet system noise.

7. **Lighting** shall be ceiling mounted fluorescent fixture(s) (remote ballasts optional) capable of providing in excess of 80 foot-candles at room center 36 in. above floor.

8. **Electrical system** to conform to national codes and shall have blower, receptacles, switches and lights. No conduit to be visible on interior or exterior surfaces and all wiring to terminate at roof mounted junction box.

9. **Acoustical Performance** - *NOTE* - Complete data for noise reduction, sound absorption, reverberation time and transmission loss appears on Page 3 of this bulletin. This data should be utilized as required by site conditions and design. For short form specification use the following.

At least 10 days prior to bidding, manufacturer shall furnish laboratory test data indicating acoustical performance for Music Practice Room design similar to that specified of not less than the following:

a. Noise Reduction - Music Practice Room when tested in accordance with ASTM E336-71 shall have a rating of not less than NIC 43. Room to room rating with 12 in. separation shall be not less than NIC 62. Acoustical designs with higher ratings can be furnished upon request.

b. Sound Absorption - Perforated interior panel surfaces shall have Noise Reduction Coefficient of NRC 0.95 when tested in accordance with ASTM C423-65.

c. Ventilation noise shall be $<$ NC-20 for Duets and Trios at center of rooms; $<$ NC-25 for larger rooms. Fan noise outside rooms shall be $<$ 60 dB and $<$ 65 dB, re 10^{-12} watts overall, respectively.

10. **Standard finish** shall be color coordinated enamel. Optional finishes include vinyl, wall carpet and Vari-tone plaques in a variety of decorative finishes.

11. **Variation and options** include elimination of floor and vibration isolation, prime paint in lieu of enamel, window blinds for privacy, special room sizes and configurations, Vari-tone plaques for reverberation control, Noise-Lock panel and double walled designs for increased noise reduction and anechoic wedges for high area sound absorption.

All designs and specifications subject to change without notice.

IAC ADVISORY SERVICE

IAC advisory service and laboratory facilities are available to help determine the IAC Music Practice Room or Moduline complex with the acoustical characteristics best suited to an individual program or budget.

Contact your IAC representative for complete specifications and drawings for all standard modules. Larger sizes can also be furnished as well as custom configurations for unusual site conditions. In addition, IAC engineering and aero-acoustic laboratory facilities are available to help provide the most effective and economical solution to your acoustic design requirements.

VARI-TONE plaques

The Vari-tone™ plaque is designed to permit fine-tuning of the reverberation response to suit individual and/or recording equipment requirements. The Vari-tone plaque which consists of an acoustically hard or soft surface comes in a number of sizes and decorative designs; its specific function is to cover selected locations to enhance tonal qualities in accordance with individual preferences. This capability provides an advantage to the user of Music Practice Rooms by offering almost total acoustical flexibility for multiple uses.

DESIGN DATA TABLE

MODEL	OUTSIDE DIMENSIONS L	W	H	WEIGHT lb	NUMBER OF WINDOWS (OPTIONAL)	NUMBER OF LIGHTS	AIR FLOW CFM
DUET	6'–0"	6'–8"	7'–10"	2300	1	1	175
TRIO	7'–0"	9'–8"	7'–10"	3400	1	2	350
QUARTET	10'–0"	10'–8"	7'–10"	4700	2	2	525
QUINTET	12'–0"	16'–8"	8'–10"	7900	3	4	700
SEXTET	12'–0"	20'–8"	8'–10"	9700	4	4	1050

Typical features shown above and discussed in the specifications and text of this bulletin can be varied to suit individual needs and budgets.

An infinite number of room sizes can be furnished using modular components. All rooms can be readily relocated, enlarged, or reduced in size to meet the educator's changing needs.

COST REDUCING VARIATIONS

prime paint in lieu of enamel finish.....single glazing in lieu of double glazing.....solid panels in lieu of windows.....rubber mat in lieu of floor carpet.....option to purchase without (a) lighting (b) electrical wiring (c)ventilation blower(d)intake-exhaust silencers(e)Acousti-Flote™ floor

OPTIONAL EXTRAS

Vari-tone plaques . . . built-in privacy blinds . . . air conditioning . . . . . factory assembly . . .vinyl and wall carpet decorative treatment . . . . . .single- or double-glazed windows . . . . . .

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REPRESENTATIVES IN PRINCIPAL CITIES

YOUR IAC REPRESENTATIVE

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WINTER 1978

Boys Town Institute— New National Resource Center Alleviates Childhood Communication Disorders

FULL STORY PAGE 4

Noise-Attenuating Benefits Locomotive

In This Issue...

COVER

Decorative treatment of Industrial Acoustics Company's audiometric-testing rooms at Boys Town Institute is characteristic of the "child-appeal" designed into many aspects of the facility to help lessen psychological stress arising from communications disorders.

"Making old locomotives like new again" is how Illinois Central Gulf Railroad describes what goes on at its spacious shop in Paducah, Kentucky. Concentrating on locomotive and locomotive-components remanufacturing, the nearly one-million-square-foot facility is the largest of its kind in the U.S.

In an assembly-line operation, each worn or damaged power unit has its service life renewed; at about half the cost of a new locomotive, according to the company. Turning out now on the average one reconditioned locomotive a day, the shop revamps the prime movers of most American railroad systems.

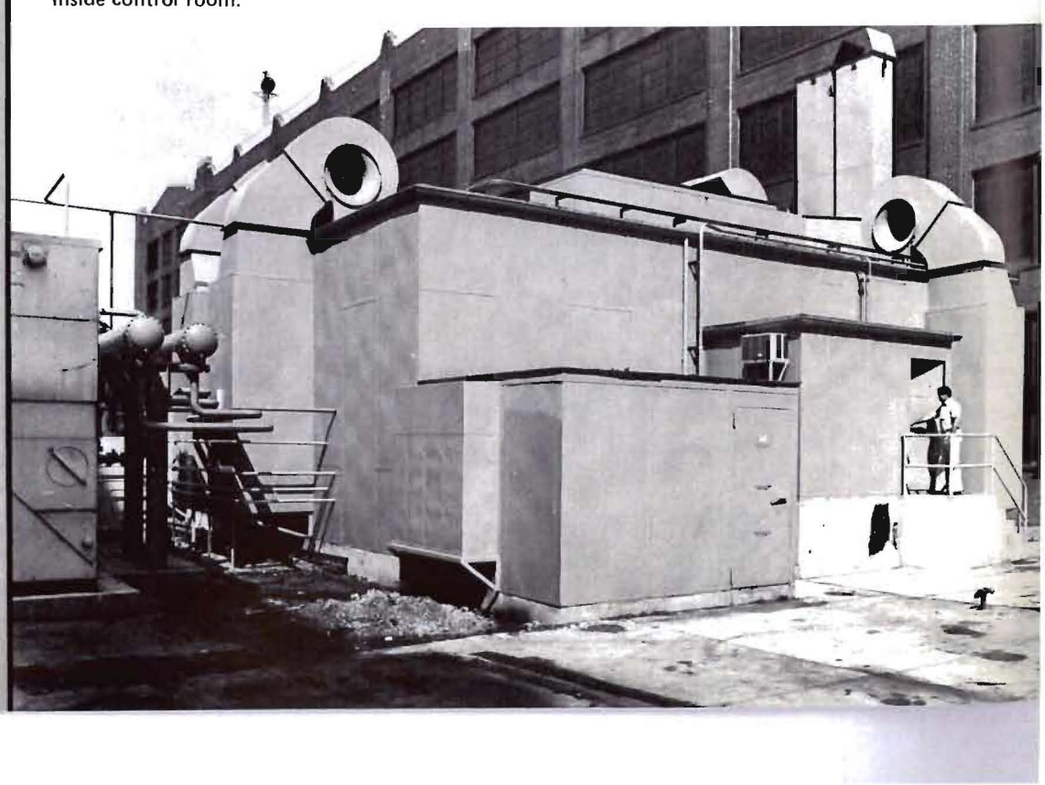
All locomotive parts are objects of rehabilitative treatment with the diesel engine receiving a healthy share of the attention. After removal from the locomotive frame, each diesel is completely dismantled; then cleaned and degreased. Crankshaft and crankcases are qualified. Any not meeting EMD specs are condemned. At the same time, cylinder assemblies are passed to a semi-automated power-assembly rebuild setup processing in the neighborhood of 40 assemblies every eight hours. Engine blowers and air compressors are also rejuvenated. Following reassembly, the complete engine is tested for eight hours prior to reinstatement in the locomotive frame.

Load Test Source of Intense Noise

This test is a decisive step in engine reconditioning for it checks out each diesel's readiness for remounting and a return to service. Until recently carried out in the open plant floor, the procedure was a troublemaker. The reason – high levels of noise made by an exposed engine under test load. Ranging from 8-cylinder 1,000-hp engines up to 20-cylinder diesels with a rating of over 4,000 hp, these units running in a stationary position generate noise (when unchecked) as high as 120 dBA.

OSHA-unacceptable and dangerous to the auditory health and general well-being of

IAC Moduline® Noise Control System housing two separate engine load test facilities. Special aerodynamic design required balance between IAC Power-Flow® Exhaust and Intake Silencers to provide flexibility for positioning of exhaust stacks for diesels ranging from 1,000 hp to 4,000 hp. Person opening door is entering control room. Also visible are intake fans and silencers. 115 dBA noise levels inside engine room are reduced to 81 dBA at 25 ft (7.7 m) outside and 64 dBA inside control room.



g Structure
e Remanufacturing

many of the 800 employees manning the shop's two shifts, the intense noise had necessitated testing being done on a third shift at a time when most workers were absent from the plant. This scheduling interrupted production flow and because testing was out of sync with the other steps of shop activity, it became more and more of a drag on the facility's capacity for handling heavier work loads, plus adding overtime costs.

Load Test Focal Point of Engine Rebuilding

To bring the process into the production mainstream shop superintendent J. T. Jones and supervisor of special projects Elmer Gregory spearheaded development of on-line installation of a noise-attenuating structure to enclose engines during testing. Their planning called for a two-celled setup with each compartment roomy enough to accommodate even the largest engine getting a facelift. The structure would eliminate the noise hazard.

Following approval by the company's top management of the concept, to implement it Mr. Jones got in touch with Industrial Acoustics Company whose acoustical engineers studied project requirements and designed the following structure now in place at the Paducah plant.

Each cell, 42-feet long, 42-feet wide, and 16 feet-high (13 x 13 x 5 m), is formed from pre-engineered, acoustically rated, all-steel, modular, 4-inch-thick (102 mm) components of IAC's Moduline® System for noise-attenuating enclosures tailored to the individual requirements of a specific project. Seals between the structure and the wall of the existing plant to which it is attached prevent vibration transmission.

Engines are trundled into a cell on a track passing through double-leaf acoustical doors, 8 feet by 14 feet (2.5 x 4 m), that IAC designed to be compatible with the acoustical qualities of the components comprising the walls and roof of each cell. Smaller personnel-access doors have like compatibility.

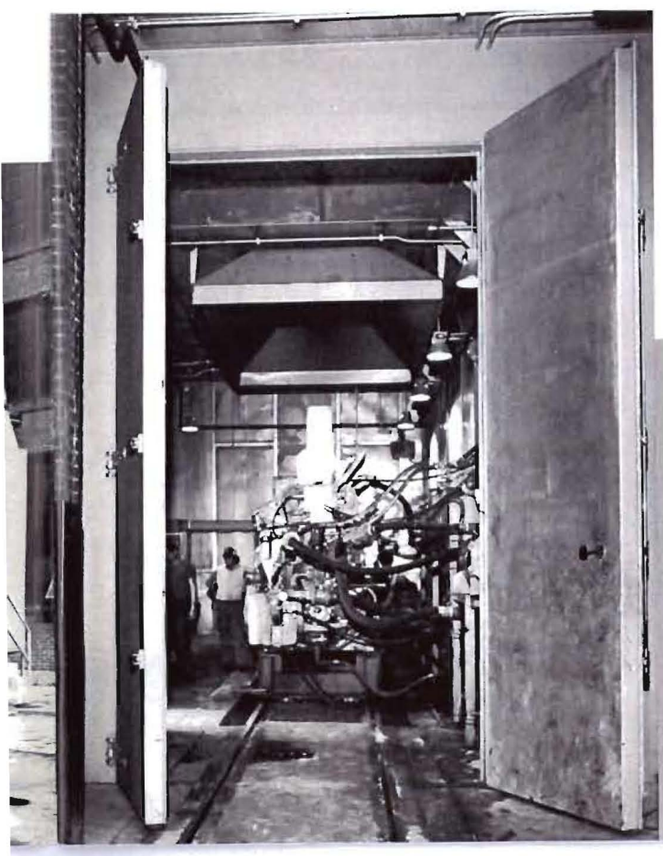
Cells are ventilated with 48,000 cfm (82,000 cu m/h) of ambient air permitting a maximum cell temperature of 110 degrees F (43 degrees C), while experiencing a top exhaust temperature of 250 degrees F (122 degrees C). Each compartment is equipped with air intake and exhaust systems including blowers and silencers. IAC also supplied the latter.

The structure features an air conditioned control room in which operators monitor with instruments and visually observe engines under test. Separating this room from the cell proper is an acoustic double wall (each section is 4-inches (102 mm) thick) with a 4-inch (102 mm) air space in between. With engines in close proximity to the operators, this construction provides them with the auditory protection they need and with a low-noise ambient in which to keep tabs on tests' progress.

Structure Already Proving Beneficial

One cell is currently in service with the second to be soon. But, even now, the enclosure is proving its worth, says Mike Moss, general locomotive foreman. He reports that testing is being carried out in conjunction with all shop operations for an improvement in general efficiency. The third shift, organized primarily to accommodate the noisy testing, has been eliminated

continued on page 6



Entrance to the cell through IAC Noise-Lock® doors. With doors closed noise levels in shop are reduced from 115 dBA inside engine room to 78 dBA at distance of 20 ft (6.1 m) from doors.

Sound Pressure Levels Measured in the Engine Test Cell Facility at Illinois Central Gulf Railroad, Paducah, Kentucky

All Test Data Taken with Engine at 8th Notch

Measured Position	Scale A	Scale C	Octave Band Center Frequency 63	125	250	500	1K	2K	4K	8K
Inside Engine Room										
Position 1	115	121	106	107	114	113	110	105	102	97
Position 2	114	120	107	112	110	112	109	105	103	98
Inside Control Room	64	96	79	71	64	64	50	43	34	29
Specification	75	–	–	–	–	–	–	–	–	–
Ambient	57	72	65	65	58	52	50	43	34	29
Outside At 25 Feet	81	89	83	85	83	80	75	69	60	49
Specification	85	–	–	–	–	–	–	–	–	–
Ambient	75	83	75	79	77	72	70	64	55	45
Inside Shop										
10 Feet From Door	79	92	89	84	79	76	74	70	66	57
20 Feet From Door	78	88	83	84	77	75	72	68	64	53
Shop Ambient	78	88	79	79	74	74	71	69	63	56

Diagnosis, Rehabil
Key Boys Town Ins

The Boys Town Institute for Communication Disorders in Children adds new dimension to Father Flanagan's dream of service to young people.

Since the famed humanitarian founded the original Boys Town over 60 years ago, it has provided a home environment and educational programs designed to mold troubled and disadvantaged youths into productive citizens.

Unfortunately, many children in this country (the number is now estimated at nearly 10,000,000) are victims of hearing loss, speech defects, and related learning disabilities which impair their performances in traditional educational programs. Without careful diagnostic evaluation, counseling, and rehabilitation, these communicatively handicapped youngsters tend to fall behind their classmates. Worse than that, they often drop out of school or are mistakenly labeled as mentally deficient as a result of poor showings on standard intelligence tests.

Early detection of a communication disorder linked to a detailed personal rehabilitation program can salvage a boy's or girl's future by opening the door to the fulfillment of intellectual and emotional potential.

This is the mission of the Boys Town Institute. To serve the specific needs of children who cannot hear, cannot speak, or who suffer from a related communications handicap.

ORGANIZATION OF THE INSTITUTE

According to Dr. Patrick E. Brookhouser, Institute director, communication disorders are not just medical in nature, but are contributory to a child's behavioral problems stemming from classroom or social frustration. Boys and girls from infancy through adolescence from anywhere in the U.S. will be eligible for care and treatment here, he says.

"When a youngster's stay at B.T.I. is over, our professionals will work with the parents, teachers, or social agencies in a child's home community to help insure continued progress toward a rewarding school experience and a useful life."

The director describes the delivery of service as effected through a comprehensive team approach with the Institute's staff composed of specialists in a variety of disciplines. These include: ear, nose, and throat surgery; pediatrics; neurology; audiology; education of the hearing impaired and those with learning disabilities; psychology; hearing science; biomedical engineering; speech and language development and pathology; and others. By grouping such specialists in a single facility, a broad range of services can be offered to each child.

INSTITUTE PROCEDURES

Here's the beginning procedure following admission to the Institute. Each youngster undergoes an incremental evaluation in an intake clinic where an ear, nose, and throat physician directing an intake team first examines the child to determine if a medical problem requiring attention exists. Next, a certified audiologist conducts hearing tests for an audiologic study.

A speech and language pathologist then evaluates the child to ascertain the presence of a speech and/or language deficit. When results from these steps are in, a decision is made by intake team members as to the need for in-depth testing of the child. This analysis can consist of a battery of medical tests including physical examinations by different specialists, laboratory workups, and related activities. It can also incorporate specialized audiological study, such as brain stem evoked response, hearing aid evaluation, assessment of speech (lip) reading ability and of auditory skills. Further speech and language evaluating and psychological testing might be scheduled, too.

While the length of evaluation time depends upon the individual child and his or her unique needs, the intake clinic procedure usually can be completed in one day. But, when the child turns out to be difficult to test, several days may be required to complete the routine.

After a youngster is evaluated, the services which follow include therapeutic-program planning, demonstration remediation

Dr. James Peck, coordinator of audiological services, carries out audiometric tests on a hearing-disadvantaged little boy. Visual contact between the test administrator and the subject is made possible by the large window of double-glazed safety glass IAC has incorporated into the construction of the multi-purpose sound suite. Its spacious dimensions are designed to negate any feeling of claustrophobia.

il itation, Research
s titute Programs

programs, and community outreach. The Institute is set up to function as a resource center, rather than as a clinic just providing therapy. Applying its team approach to finding each child's needs, the Institute is able to lay out a course of therapy and remediation to meet those singular requirements.

A staff member whom Dr. Brookhouser refers to as a "professional advocate" is assigned to work directly with the family and community to implement the program. This staffer is responsible for ascertaining the resources in or near the child's home capable of providing for follow-up care. The advocate also coordinates with schools, physicians, social agencies, and special services in the local community to see that the therapeutic effort is carried forward. Dr. Brookhouser says each advocate will stand ready to make modifications in an individual program based on talks with the hometown professionals relating to the child and his problems.

A parallel task of the advocate is to assure that parents become an integral part of the effort. Techniques are demonstrated for them while they are at the Institute, and they have ample opportunity to interact with their child under supervision of B.T.I. staff members.

PHYSICAL FACILITIES

Boys Town Institute's physical facilities comprise two major components. A five-floor 120,000 sq ft (11,200 sq m) Clinical, Diagnostic, and Rehabilitation Center and a one-level 20,000 sq ft (1,870 sq m) Language and Learning Center.

The former consists of medical clinics; facilities for audiological evaluation plus speech and language evaluation and psychological examination; biomedical research laboratories; an inpatient diagnostic unit as well as an inpatient medical/surgical section; an auditorium; and a graphics/media unit.

To support a high standard of care, each of these divisions is equipped with the most sophisticated types of instrumentation and apparatus available.

As typical of the instrumentation, Dr. Don Worthington, director of audiology and speech pathology, points to the audiometric test chambers outfitting the audiology clinic. Designed and built by Industrial Acoustics Company and installed under the supervision of an area representative, The Huff Company (Deerfield, Illinois), the chambers include five two-room sound suites, one room for test control and observation with the second the examination or patient's room.

In three of the suites, the two rooms constructed of 4-inch-thick (102 mm) modular, steel components are situated side by side and separated by a four-inch (102 mm) air space. Enclosing them is an outer shell made from 4-inch-thick (102 mm) modular components identical to those forming the inner rooms. Each of them "floats" on vibration isolators while their common enclosure features its own structurally isolated floor.

The remaining suites are composed of a single-wall control or equipment room directly attached to a 4-inch-thick (102 mm), modular-component, double-wall examination chamber. To assure the acoustical integrity of all rooms, each is equipped with flush-mounted doors with cam-lift hinges, gravity threshold compression seals, and double perimeter seals. Also, each features an IAC-designed ventilation silencing system matching the acoustical

Dr. Eric Javel, research associate in auditory physiology, enters one of the uniquely designed IAC acoustic chambers preparatory to launching a research project. The "piggy-back" door setup in which the inside door is attached to the one for the outside preserves acoustical integrity of the room-within-a-room construction of the chamber. The inside door is acoustically isolated from its neighbor.

environment in the room itself. Sound pressure levels measured three feet (914 mm) from the air intake inside a room are below the binaural threshold of hearing.

All these IAC chambers meet the stringent background noise levels mandated by the new ANSI S3.1–1977 criteria for permissible ambient noise during audiometric testing.

STRUCTURE'S CHILD APPEAL

The external appearance of the chambers has been fashioned to be appealing to children through a dramatic application of supergraphics. Upon entering the clinic, a child does not encounter a forbidding assemblage of monochromatic walls and doors, but an expanse portraying a brilliantly colored cartoon-like version of an airport with chubby-bodied airplanes coming in and taking off. The Institute's graphic artist who conceived and executed the mural has made hardware such as door handles part of the planes' gear or equipment on a toy-like fuel truck.

This treatment is illustrative of the overall concept of the Institute structure designed to cater to the imagination, curiosity, and needs of children with communications problems. The building abounds in vivid colors, playrooms, and toys to encourage the children to interact with each other and the building proper. The see-through walls of many of the physical spaces permit staff members to work with the youngsters in settings which are warm and inviting.

Since communicatively disordered children are subject to unique psychological stresses, the Institute's total environment has been oriented with the help of a panel of consultants to easing the young persons' adjustment to their surroundings.

Adjoining the Clinical Building is the Language and Learning Center headed by Dr. Noel D. Matkin. He coordinates a staff of communication-disorder specialists offering in-depth evaluations and remediation. The Center is a model diagnostic educational facility surrounded by a cluster of living units in which children

continued on page 8

SOUND decisions

DELIVERY OF DESTROYER SILENCERS NOW 90% COMPLETE

With twenty-eight of thirty shipsets comprising gas turbine inlet and discharge silencers now delivered for installation aboard the U.S. Navy's new DD 963 gas turbine-powered destroyers, IAC is nearing completion of an $8-million contract awarded in 1972.

Morton I. Schiff, company vice president whose Special Products Department has overseen the design, testing, and manufacture of the silencing systems, reports that IAC's fulfillment of the contract is on schedule with all silencers accepted by the prime contractor, Litton Industries. As designer and builder of the versatile class of ships that will form the backbone of the Navy's destroyer fleet, Litton selected IAC as the supplier of the vital noise-control systems.

Prior to fabrication of the silencers, each was evaluated in the wind tunnel of IAC's Aeroacoustic Laboratory to show that acoustic noise-reduction, self-noise, and aerodynamic specifications were met. In addition, the silencers were placed on a barge which was subjected to large underwater explosions to test structural strength under very severe conditions. □

EMPLOYEE SERVICE AWARDS REPRESENT OVER 3,000 YEARS OF NOISE-CONTROL EXPERIENCE

Continuing a corporate tradition of awarding certificates and gold pins to employees who have been with the company for five, ten, fifteen, and twenty years, Industrial Acoustics Company during the holiday season at the end of 1977 presented 19 more such awards to men and women employed at company headquarters in Bronx, New York.

These presentations brought the number of recipients (since inception of the program) of pins for five-year service to 189, for ten years to 60, for fifteen years to 43, and for twenty years to 20, this last group including four persons joining it in '77. Altogether, this makes for a total of 312 awards in New York alone.

In addition, 30 five-year pins have been given to employees at the company's Argo manufacturing subsidiary in Berwick, Pennsylvania, while among 31 employees saluted at Industrial Acoustics Company, Ltd. (Staines, England) there are six who received 10-year awards. Its managing director George Sotos marks 25 years with IAC in March 1978.

Considering the total service given to the company by these employees in reference to noise-control engineering experience, their association represents better than 3,000 years of such know-how. President Martin Hirschorn points out that this reservoir of capability of which IAC is the repository is not approached by any other company in its field. As he said in making the awards, "Capable, experienced people are the company's strength. That's why I always derive so much pleasure from these presentations." □

Noise-Attenuating Structure Benefits Locomotive Remanufacturing

continued from page 3

with personnel transferred to the other shifts. When both cells are operational, testing is expected to be boosted from 12 to 14 engines to at least 20 per month.

Facility Satisfies Acoustical Specifications

The engine-test unit's acoustical performance was confirmed through a field analysis made by John Duda of IAC's engineering staff and witnessed by Elmer Gregory and Mike Moss. An interested onlooker was Dr. M. T. Summar of MTS Associates and a consultant on environmental matters to the railroad industry.

The check was done while a 2,000-hp diesel in the cell was running in the eighth-notch or maximum-power setting. Employing a sound-level meter and an octave-band analyzer to measure sound-pressure levels, Mr. Duda took his readings in reference to the structure's original acoustical specifications. They mandated that sound-pressure levels inside the control room should not exceed 75 dBA and at 25 feet (7.7 m) from the wall outside, noise should not top 85 dBA with engines rumbling along in the eighth-notch setting.

The test data was recorded at two positions along the length of the diesel engine in the compartment midway between the engine and the wall of the control room, at the operators' station inside this room, and outside the enclosure at 25 feet (7.7 m) from the cell's exterior wall. The table shows that the acoustic data is satisfactorily within design specs (with a single engine operating). Mr. Duda's report concludes with this observation: "From the measured data and layout of the cell and control room, it can be anticipated that the facility will also be well within design specifications when the second cell is placed in operation and two engines are running simultaneously."

Thus has a specially designed acoustic structure scored multiple benefits for Illinois Central Gulf Railroad in a major arm of its service facilities. A serious hindrance to a smooth production flow has been wiped out, working conditions have been improved by neutralizing a hazard to employees' hearing, and the plant environment is better through the reduction of noise. □

Noise-Control Engineering Abets War Games in the Sky

At Utah's Nellis Air Base headquarters for the most realistic air-combat maneuvers in the history of the U.S. Air force, a completely aircooled single-cell acoustical test system (Fig. 1) is the site of ground-runup testing of General Electric J-85 afterburning jet engines powering Northrop F-5E Tiger fighters.

In the war games, these planes modified to resemble the USSR's MiG-21s and manned by Air Force pilots trained in the Russian mode of combat flying, defend mock targets in the Nevada desert when attacked by squadrons of other strike aircraft. The intense battle tactics place heavy stress on the planes with the result that the fake MiGs must undergo periodic maintenance testing in the system designed by Industrial Acoustics Company.

Engineered to accommodate testing of seven to ten engines daily, the system features a two-stage augmentor/ejector (Fig. 2) which IAC engineers developed to keep temperatures within the facility at safe levels. This device augments enough cooling air to reduce engine-discharge heat from 3600 degrees F (1980 degrees C) to a maximum level of 750 degrees F (400 degrees C) within the system while keeping the engine-inlet bellmouth and the engine itself free of air-flow distortion.

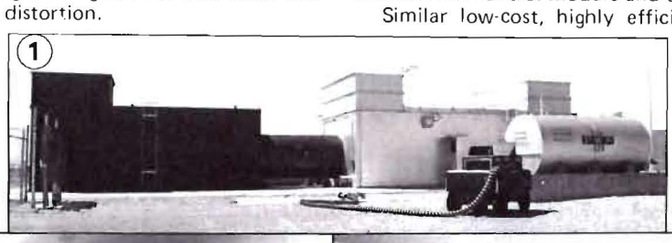
The acoustical system needs no cooling medium other than air to obtain safe operating temperatures and all cooling effects come from jet pump action of the engines being tested. So, with no secondary mechanical devices called for, the system with virtually no mechanical parts needs only minimal maintenance.

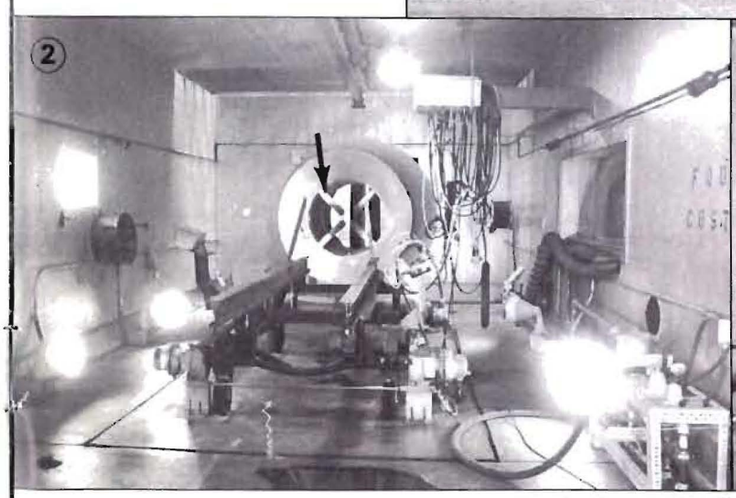
Demountability is another unique feature of this facility. Measuring 16 ft wide by 68 ft long by 20 ft high (5 x 21 x 6 m), it can be truck transported to a different site without loss in acoustical or aerodynamic performance. A 6-inch-thick (152 mm) concrete slab capable of sustaining a 1500 lb/ft (2226 kg/m) perimeter load is a sufficient foundation.

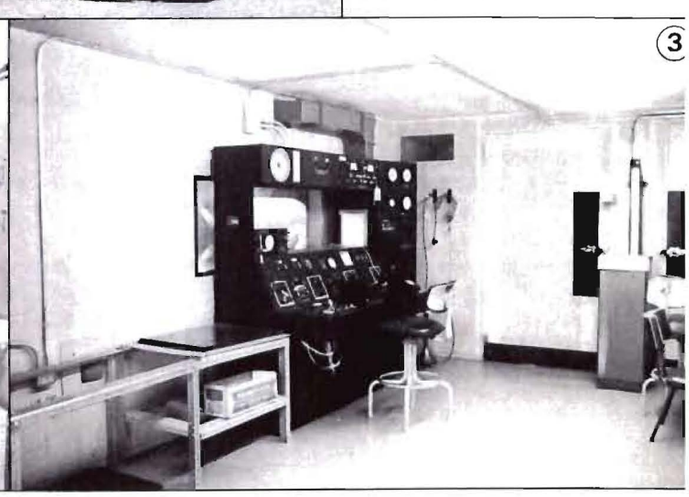
Structurally, the facility will withstand a maximum depression of 6-inches (152 mm) of water and winds up to 125 mph (204 kmh) Most components in contact with engine-discharge gases are fabricated from stainless steel for long service life. At full afterburner operation of the J-85–GE-21 engine, the test unit handles about 350 lb/sec (168 kg/sec) of flow with a top cell depression of 1-in. (25 mm) water.

Completing the complex is a weather-tight, vibration-isolated control module, (Fig. 3), environmentally maintained for total safety and comfort of operating personnel. They keep an eye on tests through a distortion-free, safety-plate-glass window between the control module and the test area.

Similar low-cost, highly efficient aircooled test systems for the J-85 jet engines are in service at Laughlin Air Base in Del Rio, Texas, and at Alconbury Air Base, northwest of Cambridge, England, home of the U.S. Third Air Force which also flies the F-5E Tiger fighters. □







1. Primary and secondary IAC Power-Flow® Air Intake Silencers and Exhaust Gas Silencers are mounted atop test enclosure made of IAC Super Noise-Lock® components. Cell cuts noise to 89 dBA at a distance of 250 ft (76 m). 2. Test cell interior shows two-stage augmentor/ejector tube. Note four aircooled "spoilers" (◄—) which reduce low-frequency jet engine noise. 3. Personnel run tests from a control module in which sound pressure levels do not exceed 75 dBA.

IAC project engineer Milton Wallach was awarded a Department of Defense "Certificate of Merit" for outstanding engineering service performed on this mission of the USAF's Joint Test Force.

B.T.I.'s auditorium can be divided into sound-attenuated rooms enabling different groups to meet simultaneously. IAC's Trackwall® movable acoustical wall system gives this flexibility. Trackwall consists of individual panels supported by ball bearing overhead trolley assemblies. When panels are shifted into place, a one-man job (as J.C. Mitchell, president of The Huff Company, IAC area representative, demonstrates), they are set by a single mechanism activating all seals. Not in use, panels are stored off the floor, out of sight.

receiving B.T.I.'s services live either with their parents or with specially trained house parents.

RESEARCH FACILITIES

In addition to being a nationally oriented clinical and remedial center, the Institute is serving as a research facility to try to find answers to the causes of childhood communications difficulties and the most effective treatment for them.

The Human Communications Research Laboratories, Dr. Charles Watson, director, are conducting basic and clinical investigations to determine processes underlying normal and abnormal communication and to develop fresh approaches to evaluation and rehabilitation of the communicatively disadvantaged.

These labs are outfitted with the last word in equipment to facilitate attainment of research goals. IAC again participated in the physical implementation by supplying a number of different acoustical chambers. Some are utilized in basic research such as how sounds are recorded in single nerve fibers, while others will be used in programs (involving human subjects) looking into, for example, behavioral patterns to determine the relationship between sound stimuli and the sensations they produce.

Each of the IAC-designed facilities was built and installed in direct response to how it would be utilized. A chamber for auditory-physiology research is set up to be mechanically isolated from the existing building. Of double-wall (room-within-a-room) construction, it consists of two housings formed from 4-inch-thick (102 mm) modular components separated by a 4-inch (102 mm) air space. For double protection from noise coming from vibrations of the Institute building or other structural/environmental noise, the inside room has an inertia block floor resting on vibration isolators. The chamber proper is radio-frequency shielded and 60 Hz grounded.

From the research carried out in the Laboratories is expected to emanate a flow of information about new findings, new clinical approaches, and technology which the Institute will disseminate free-of-charge to anyone who can make use of the vital data.

This then is the Boys Town Institute for Communication Disorders in Children. Begun in 1972 and fully operational as of late 1977, it is aimed at the development and testing of new preventive, diagnostic, rehabilitative, and educational techniques for managing childhood communications problems. Through the Institute, thousands of boys and girls will be helped to learn the language of life and to know the sounds of the world. □

New Literature for You

Paper Company's Attack on Plant Noise Profiled

Great Northern Paper's comprehensive noise-abatement program using Noishield components of IAC's Moduline System, All-Purpose Rooms, and air-flow silencers is run down in Bulletin 6.1237.0. Delves into all aspects of the control effort including: noise surveys, selection of noise-reduction equipment, follow-through and preventive measures. On-location photos□

Jet Engine Noise-Control Systems Reviewed

Specialized design by Industrial Acoustics Company, Ltd. (Staines, England) and IAC (New York) of aircooled noise-control systems to reduce the din of military aircraft jet engines undergoing testing on a test bed or while in the strike planes themselves during ground runup is described in Bulletin 2.0004.0. Systems include: inlet and exhaust silencers, test-facility housings, engine test stands, secondary inlet silencers, control apparatus and rooms, and restraining gear. Photos, sketches, charts. □

Personnel Noise Shelter Selection Criteria Presented

How noise-reduction characteristics of IAC All-Purpose Room Noishelters can be used to develop guidelines for maximum ambient noise levels relative to specific inside criteria is featured in Bulletin 6.0013.0. It is the latest advisory on noise control through installation of personnel enclosures. Prepared by company president Martin Hirschorn. Charts, tables, photos. □

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TEST REPORT No. 416-75 – IAC MUSIC PRACTICE ROOMS

July 7, 1975

1. INTRODUCTION

This report submits our findings concerning the aero-acoustic tests conducted at Industrial Acoustics Company's Laboratory in a 10,000 cu ft Reverberation Chamber. All tests were supervised and witnessed by the undersigned.

The purposes of these tests were:

a. To determine Noise Reduction (NR) and Noise Isolation Class (NIC) rating for this product line in the following test configurations:

1. Out-In (reverberation chamber to module).
2. In-Out (module to reverberation chamber – diffused source sound field).
3. In-Out (module to reverberation chamber – near field source measurement location).
4. Room to room (module to module) with 12 in. (300 mm) spacing between modules.

b. To measure the ambient sound pressure levels (SPL) within the module, with ventilation equipment operating normally.

c. To measure the airflow supplied by the ventilation system.

d. To establish sound power levels, re: 10^{-12} watts, introduced into the reverberation test room by the ventilation system.

e. To establish frequency response envelope of the module in full octaves and 1/3 octave bands with a calibrated omnidirectional sound source. This frequency response envelope of the volume of the module was established in terms of ± deviation in decibels (dB) as one-half the difference between the two extreme points of that envelope at the frequency in question or

$$\pm \text{deviation} = \frac{\text{dB (max.)} - \text{dB (min.)}}{2}$$

where dB (rnax.) and dB (min.) represent the highest and the lowest measured dB point of the sound field, respectively.

2. STANDARDS

NR measurements were made in accordance with the American Society for Testing and Materials (ASTM) Designation E336-71, Standard Recommended Practice for the Measurement of Airborne Sound Insulation in Buildings; and with applicable portions of the ASTM Designation E90-70, Standard Recommended Practice for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions. All microphone stations, within the module, were always kept at 43 in. (1075 mm) off the floor (ear level of a sitting subject) at the geometric center of the module. When the module was used as a Source Room (in either "in-out" or "module-to-module" configuration) two highly powered flat spectrum sound systems with specially designed diffuser elements were utilized and positioned in such a fashion as to create a uniform diffused sound field throughout the volume of the module. Extensive probing was performed, prior to testing, in order to assure the omnidirectional pattern of the sources and minimum variations of the sound field, thereby securing uniform illumination of all internal surfaces and in turn providing valid averaging throughout the volume.

For the near field source measurement the microphone was located 15 in. (375 mm) above the module floor between the two opposite facing sound generating systems.

Noise Isolation Class (NIC), single number rating, was established according to ASTM Standard E413-70T, utilizing the Sound Transmission Class (STC) contour.

Sound Power Levels (PWL) were determined in accordance with applicable portions of ANSI S1.21-1972 Standard and ASHRAE Standard 36-72. PWL was established by the comparison method which uses a calibrated reference sound source.

Air flow capabilities of the ventilation system were established by a Pitot tube – Velometer correlation traversing through a cross section of a duct attached to the air grill entrance into the module. This straight duct provided a recovery air path enabling the air to completely fill the duct at the point of measurements.

SPL within the module due to normally operating ventilation equipment and the Frequency Response Envelope of the room were established according to standard practices as described in E336-71, E90-70, and ASHRAE 36-72.

3. DESCRIPTION

The IAC Music Practice Rooms used in this test program were two (2) identical assembled standard Duet models with outside dimensions of 80 in. (2000 mm) wide by 72 in. (1800 mm) long by 94 in. (2350 mm) high. The ventilation panels overhung the 80 in. (2000 mm) dimension by 2 in. (50 mm) on each side of the room. Each unit weighed 2300 lb (1050 kg). Wall and ceiling panels were constructed of 16 gauge solid steel outer surface and 16 gauge solid or 22 gauge perforated interior surfaces. Perforations consisted of 3/32 in. (2.34 mm) holes on 3/16 in. (4.69 mm) staggered centers. One hundred-seventeen square feet (117 sq ft) (10.87 sq m) of interior surfaces were perforated. Panel surfaces were welded to a steel frame filled with sound absorbing and dampening elements to form a 4 in. (100 mm) thick panel. Ventilation panels were of solid 16 gauge steel surface on both sides of similar welded construction and contained a sound absorbing silencer section resulting in a 6 in. (150 mm) panel thickness.

One intake and one discharge silencer panel formed a portion of the walls of each room. The intake panel contained a supply fan. Ventilation systems were in complete operating condition during the entire test procedure. Each module contained an out-swinging door with clear opening of 36 in. (900 mm) wide by 79½ in. (2000 mm) high. Each leaf con-

tained a 27 in. (675 mm) wide by 74½ in. (1850 mm) high double glazed window. Each leaf was operating on two IAC cam-lift hinges. Double magnetic/absorptive seals were used in the jamb and head of door assemblies with compression seals at floor. Sills were flush with no raised threshold. Doors were in complete operating condition during test. Floors were 4 in. (100 mm) thick, constructed of solid 11 gauge steel top surface and 16 gauge bottom surface welded to a steel frame and filled with sound absorbing elements. Floors rested on vibration isolators rated to give each module a natural frequency of 6¼ Hz. Floors were carpeted with ¼ in. (6.25 mm) thick pile rug with foam backing. Each room was painted on interior and exterior surfaces.

TABLE 1 – Out-In (Reverberation Chamber to Module) NR Data

CENTER FREQUENCY, HZ		NOISE REDUCTION, DB	
1/3 OCTAVE BAND	OCTAVE BAND	1/3 OCTAVE BAND	OCTAVE BAND
	63		24
100		25	
125	125	28	26
160		24	
200		27	
250	250	31	28
315		36	
400		38	
500	500	38	39
640		41	
800		45	
1000	1000	48	47
1250		48	
1600		51	
2000	2000	52	53
2500		53	
3150		55	
4000	4000	57	55
	8000		55

NIC Rating 43

Note: 1/3 octave band data are plotted in Fig. 1.

TABLE 2 – In-Out (Module to Reverberation Chamber) Diffuse Source Sound Field NR Data

CENTER FREQUENCY, HZ		NOISE REDUCTION, DB	
1/3 OCTAVE BAND	OCTAVE BAND	1/3 OCTAVE BAND	OCTAVE BAND
	63		17
100		11	
125	125	16	16
160		20	
200		26	
250	250	27	27
315		34	
400		35	
500	500	39	40
640		46	
800		53	
1000	1000	53	51
1250		54	
1600		53	
2000	2000	54	54
2500		53	
3150		53	
4000	4000	55	54
	8000		57

NIC Rating 40 – Diffused Source Sound Field

Note: 1/3 octave band data are plotted in Fig. 2.

TABLE 3 – In-Out (Module to Reverberation Chamber) Near Field Source Measurement Location NR Data

CENTER FREQUENCY, HZ		NOISE REDUCTION, DB	
1/3 OCTAVE BAND	OCTAVE BAND	1/3 OCTAVE BAND	OCTAVE BAND
	63		29
100		22	
125	125	22	26
160		30	
200		32	
250	250	33	32
315		34	
400		38	
500	500	35	39
640		41	
800		48	
1000	1000	52	48
1250		51	
1600		55	
2000	2000	54	53
2500		54	
3150		56	
4000	4000	62	60
	8000		71

NIC Rating 43 – Near Field Source Measurement Location

Note: 1/3 octave band data are plotted in Fig. 3.

TABLE 4 – Room to Room (Module to Module) NR Data with 12 in.(300 mm) Spacing Between Modules

CENTER FREQUENCY, HZ		NOISE REDUCTION, DB	
1/3 OCTAVE BAND	OCTAVE BAND	1/3 OCTAVE BAND	OCTAVE BAND
	63		35
100		33	
125	125	38	38
160		48	
200		51	
250	250	53	51
315		65	
400		68	
500	500	75	77
640		87	
800		97	
1000	1000	97	96
1250		102	
1600		104	
2000	2000	103	103
2500		102	
3150		>89	
4000	4000	>93	>93
	8000		>93

NIC RATING 62

Note: 1/3 Octave band data are plotted in Fig. 4.

TABLE 5 – Ambient Sound Pressure Levels (SPL), re: 0.0002 μbar Within the Module, with Ventilation Equipment Operating Normally

Octave Band Center Frequencies, Hz	63	125	250	500	1000	2000	4000	8000
Sound Pressure Levels (SPL) dB	44	34	33	27	19	15	15	15

The test blower intake was fitted with 6 in. (150 mm) deep blow-through silencer.

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TABLE 6 – Sound Power Levels (PWL), re: 10^{-12} watts, Introduced by the Air Mover Inserted Outside the Module into the Reverberation Test Room

Octave Band Center Frequencies, Hz	63	125	250	500	1000	2000	4000	8000
Sound Power Levels (PWL), dB	54	49	55	55	44	41	40	35

The test blower intake was fitted with 6 in. (150 mm) deep blow-through silencer.

TABLE 7 – Flatness of Frequency Response Envelope Throughout Module's Volume in ±dB

CENTER FREQUENCY, HZ		DEVIATION ±DB	
1/3 OCTAVE BAND	OCTAVE BAND	1/3 OCTAVE BAND	OCTAVE BAND
50		7.0	
63	63	2.3	3.9
80		2.6	
100		3.2	
125	125	3.5	3.1
160		3.0	
200		2.6	
250	250	2.4	2.5
315		2.7	
400		3.7	
500	500	2.1	1.3
640		2.0	
800		2.5	
1000	1000	1.9	1.8
1250		1.3	
1600		3.2	
2000	2000	3.0	2.1
2500		3.5	
3150		1.6	
4000	4000	0.7	2.0
5000		0.7	
6300		0.6	
8000	8000	0.9	1.3
10,000		4.0	

Note: Octave band data and 1/3 octave band data are both plotted in Fig. 5.

Air Delivery per Ventilation System

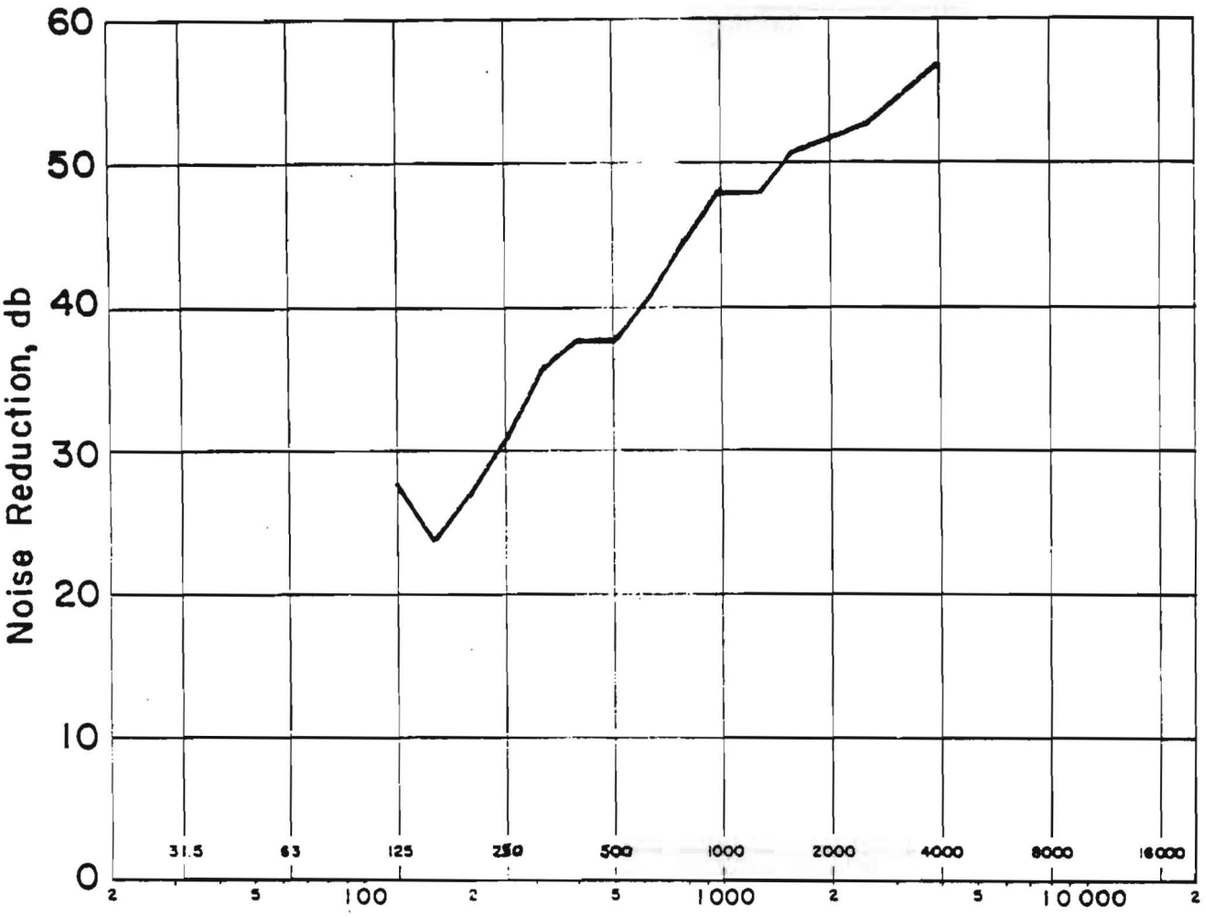
One intake and one exhaust silenced air path containing the fan were inherent to a single ventilation system which flushed the module with 175 cfm (4.95 cu m/min).

Witnessed and Certified by:

Fred Shen, P.E.
Cerami & Associates, Inc.

TEST NO. 416 75 JULY 7, 1975

IAC CONCERT SERIES MUSIC PRACTICE ROOMS



NIC 43

OUT-IN (REVERB. ROOM TO MODULE)

FIGURE 1

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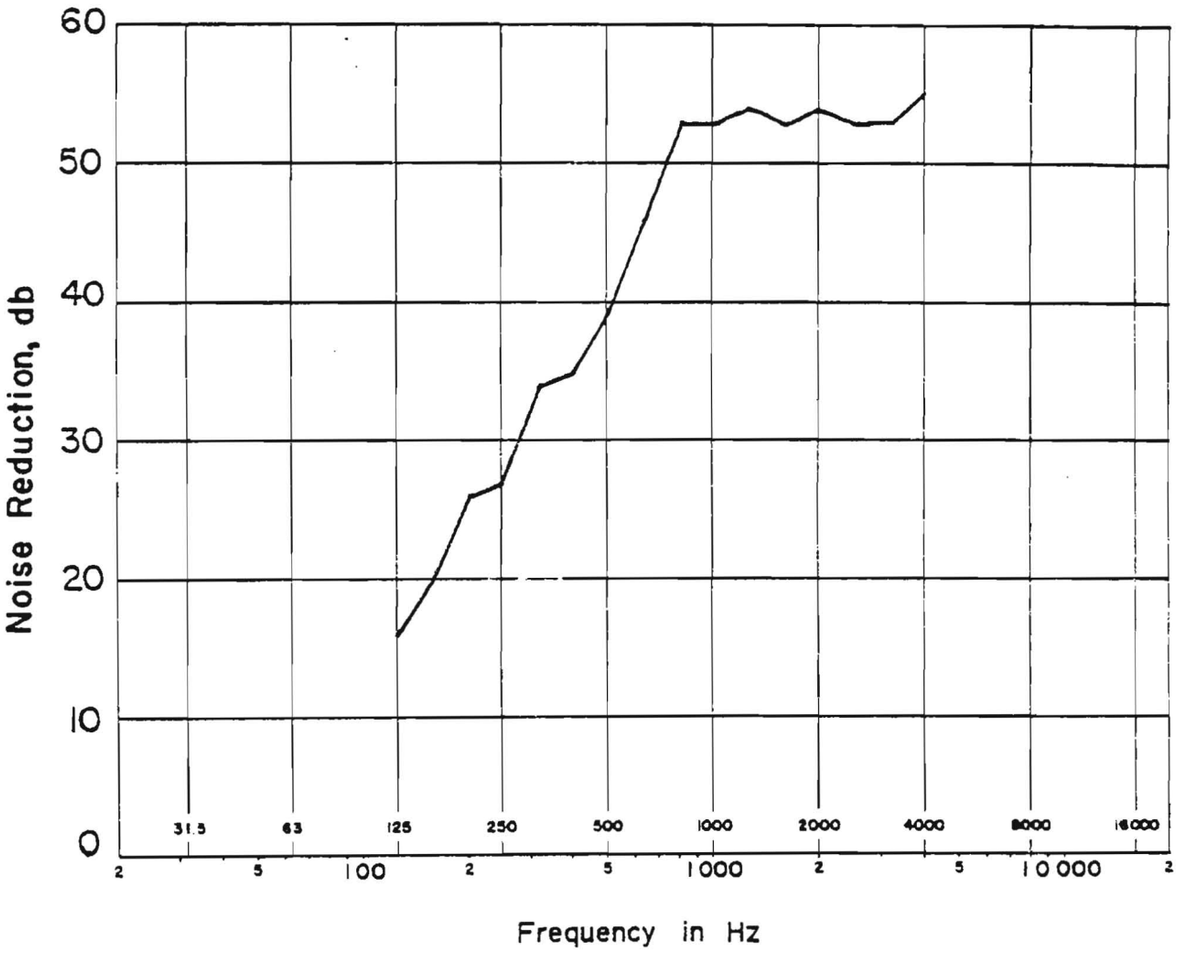

NIC 40

IN-OUT (MODULE TO REVERB. CHAMBER)
DIFFUSE SOURCE SOUND FIELD
FIGURE 2

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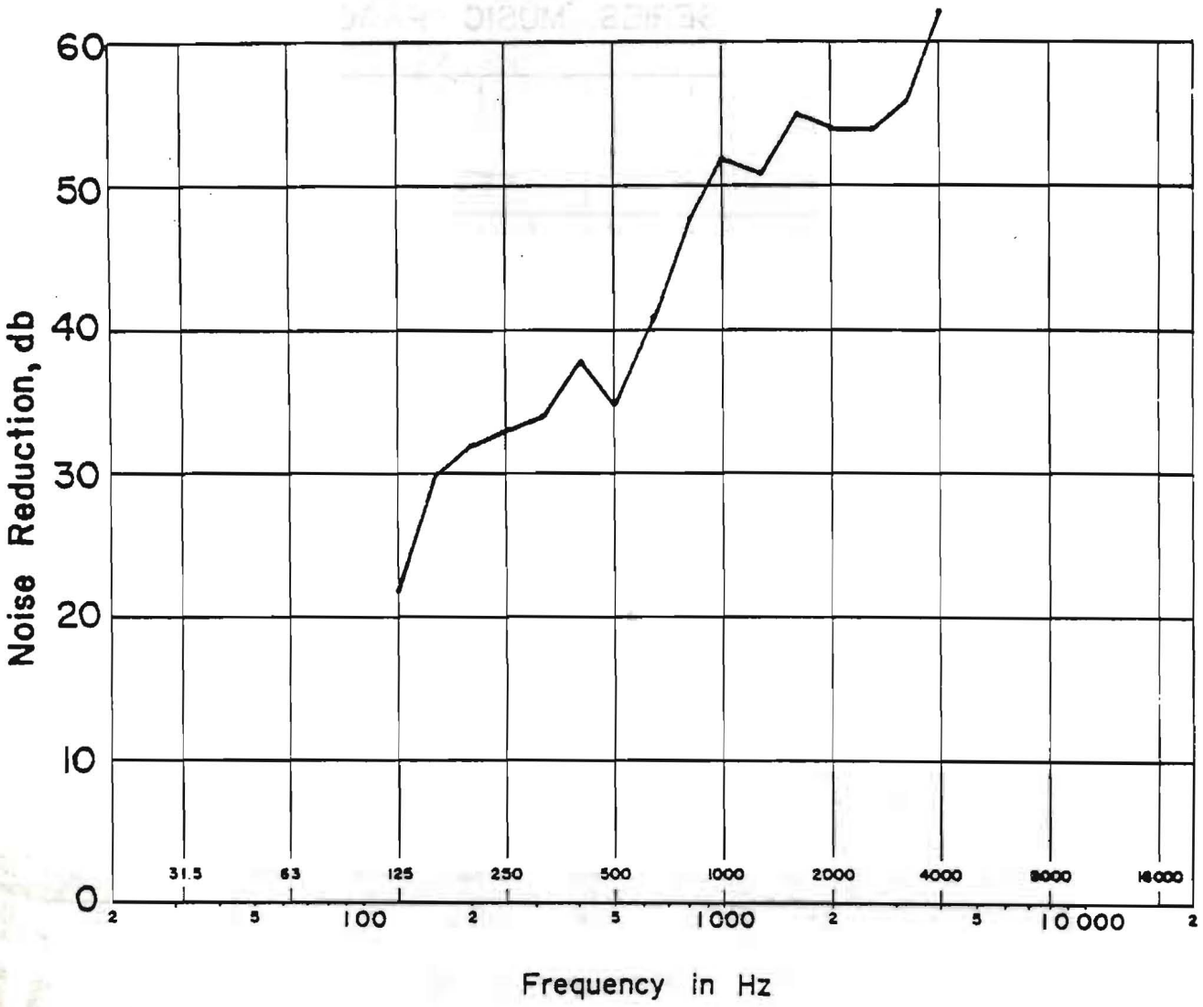

NIC 43

IN-OUT (MODULE TO REVERB. CHAMBER)
NEARFIELD SOURCE MEASUREMENT
LOCATION

FIGURE 3

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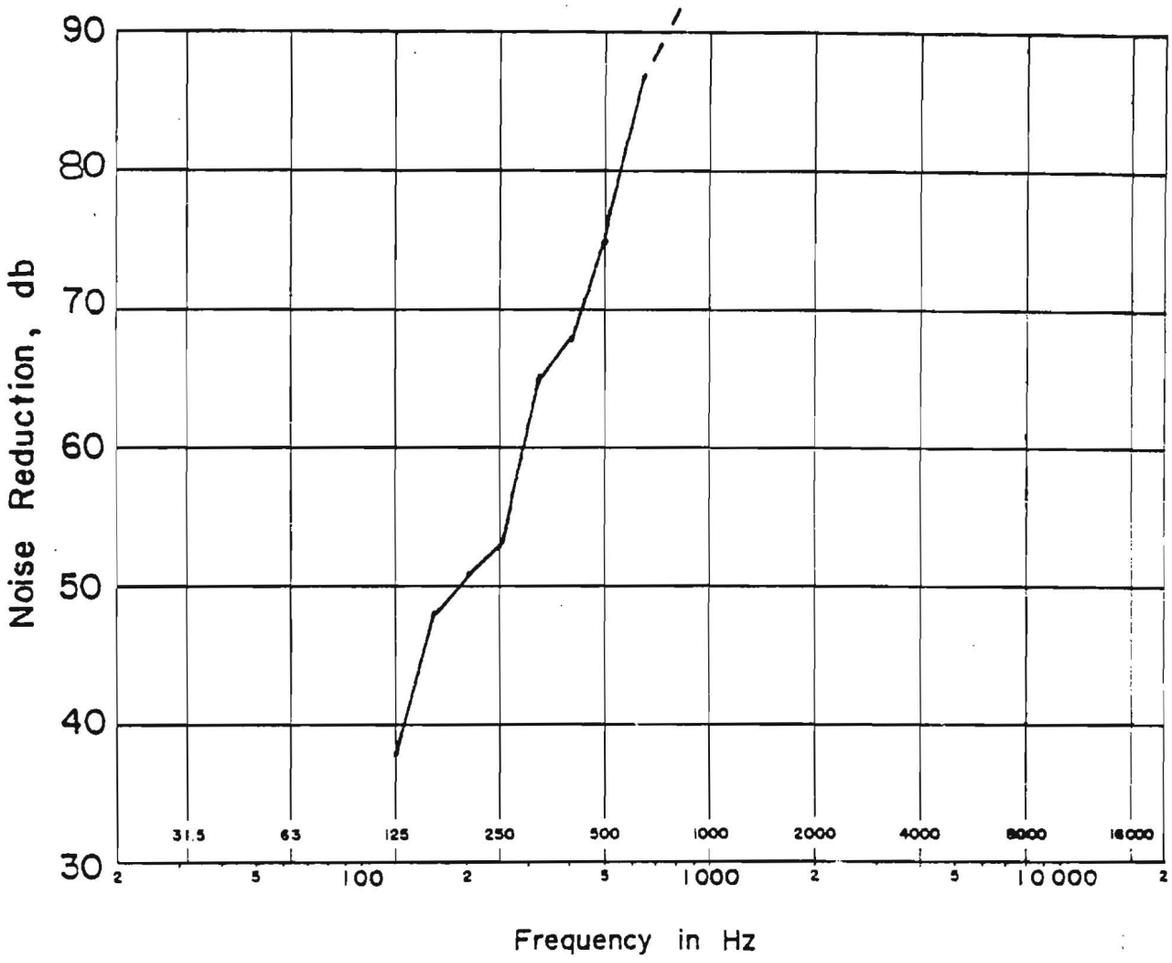

NIC 62

ROOM TO ROOM (MODULE TO MODULE)

FIGURE 4

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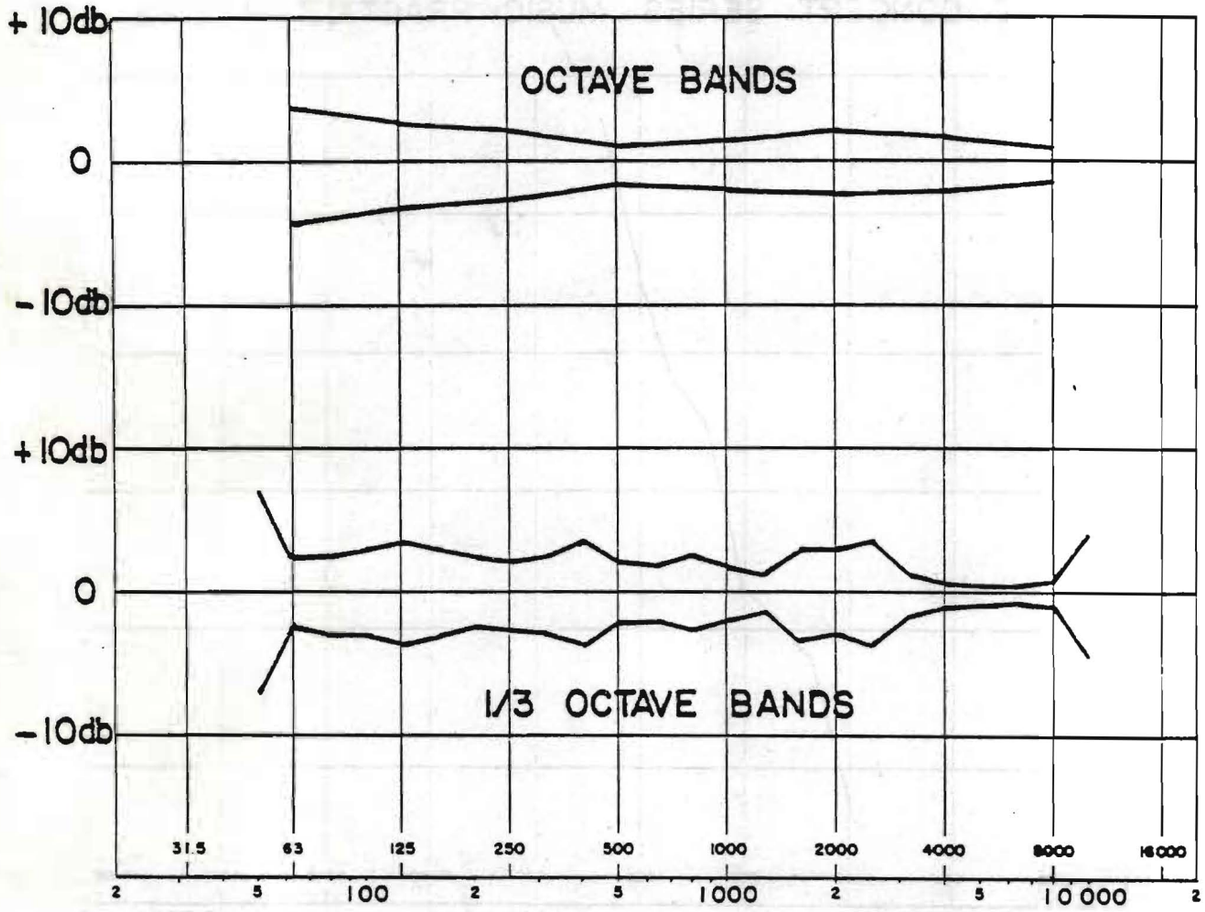

FREQUENCY RESPONSE ENVELOPE

FIGURE 5

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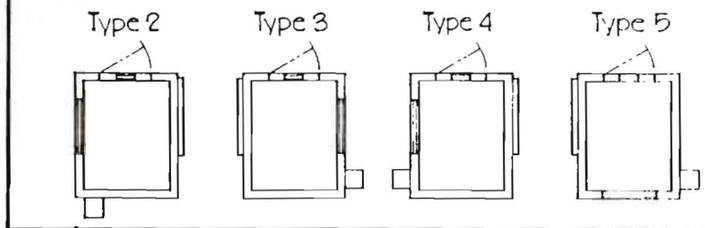
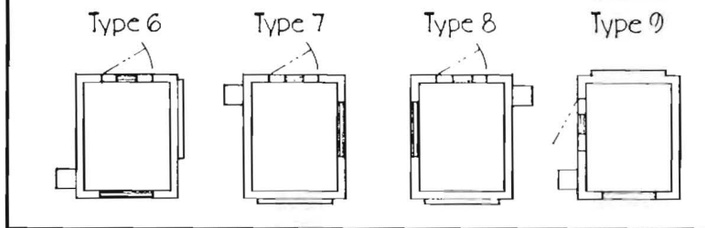
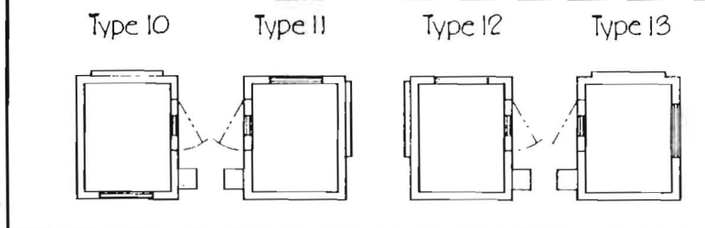
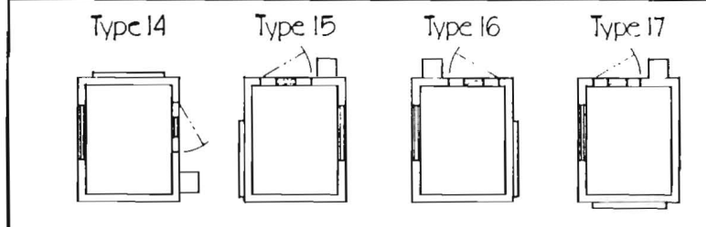
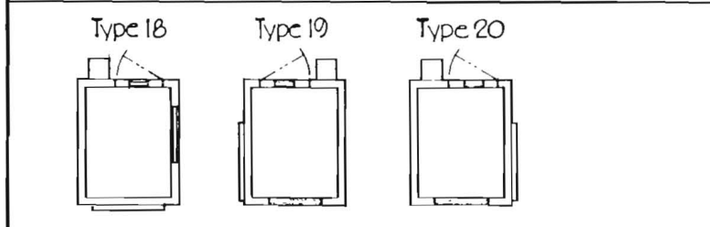
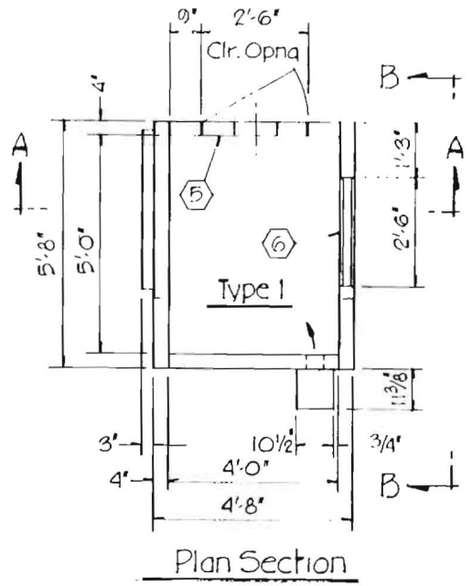


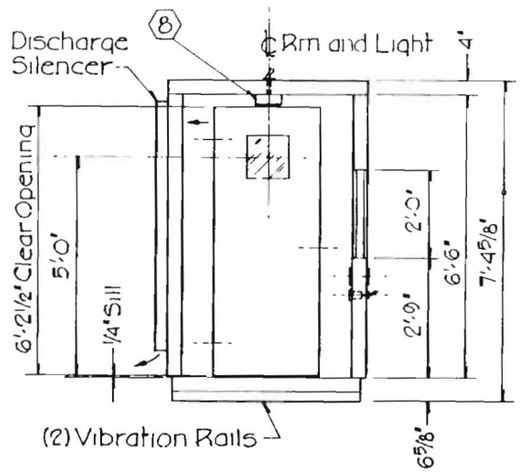


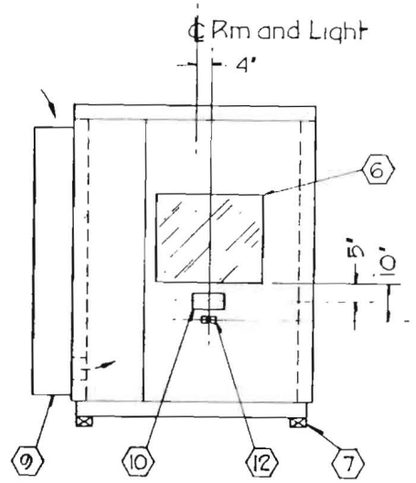












GENERAL NOTES:

1. TOTAL ESTIMATED DESIGN WEIGHT: 1,800 pounds
2. PAINT FINISH: Note alternates (Check one)

	☐ A	☐ B	☐ C
Interior:	Sun. Yellow	Light Blue	Light Green
Exterior:	Sandalwood	Med. Beige	Med. Grey

3. LARGEST SIZE PANELS: 48"W x 78"H x 4" thick.
4. ELECTRICAL: All conduits, KO boxes, switches, ballast box, wires and wiring, not by IAC.
5. DOOR: (a) IAC 30"W x 74 1/2"H clear opening with 12"W x 12"H double glazed window
   (b) Doors for type no. 1 thru 8 may be hinged left or right.
   (c) Opposite door for room types 9 thru 20 will cause interference with V 100 silencer.
6. WINDOW: IAC 30"W x 24"H double glazed in wall
7. (2) Vibration rails, each loaded for 1,175 pounds.
8. LIGHT FIXTURE: (1) Mercury No. M-106 240RS fluorescent lamp with plastic cover Fluorescent light ballasts are to be removed and wired remotely.
9. BLOWER CHARACTERISTICS: 115 volts – Single phase 60 cycles 24 watts each V-100 blower silencer
10. Audiometric jack panel consists of the following.
    Interior: (4) Switchcraft 128 Jax
    (1) Cannon Conn. No. XLR 3-13N
    Exterior: (4) Switchcraft 128 Jax
    (1) Cannon Conn. No. XLR-3 14N
11. Customer must assemble room on a flat and level floor area (± 1/4" in 10" non-cumulative).
12. Recessed duplex receptacle is rated for 15A, 115V, 60 cycles.

ISSUE	DATE	BY	DESCRIPTION OF ISSUE	CHK	APPD
A	7-19-72	RP	For approval	LEA	LEA

DESCRIPTION: IAC Schedule 40 Tape Recording Sound Isolation Room - Model No. 45

FOR:

Industrial Acoustics Company, Inc.
1160 Commerce Ave., Bronx, N.Y. 10462

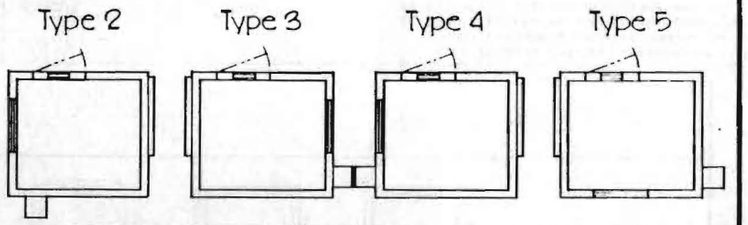
JOB No.:

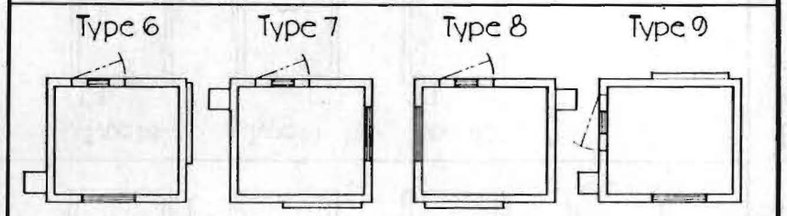
DRAWING No.: C-62957-10

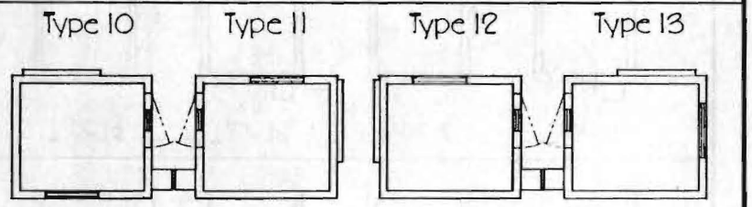
ISSUE: A

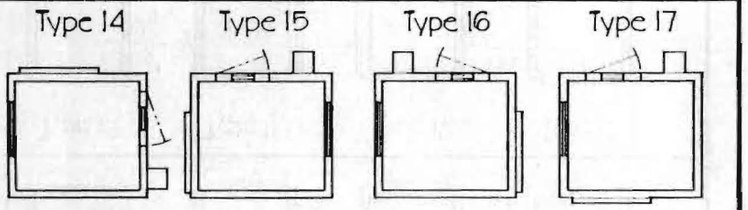
BULLETIN 6.0130.0 (45)

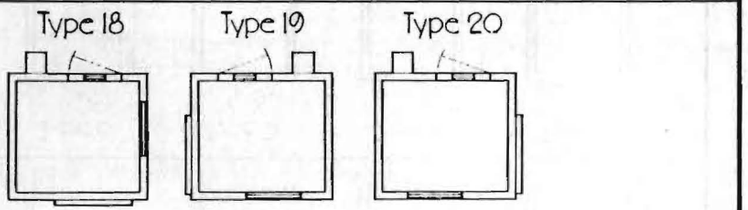
11" x 17"

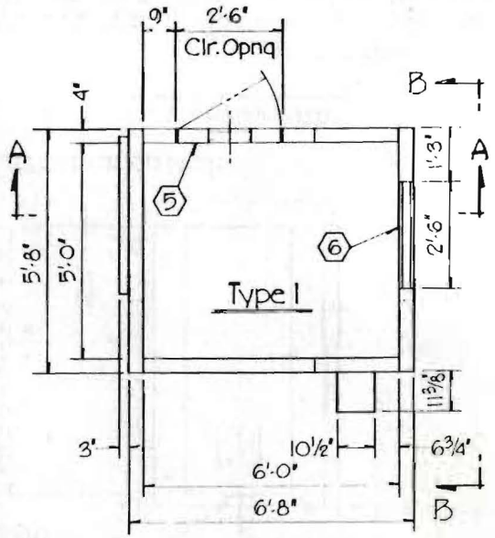












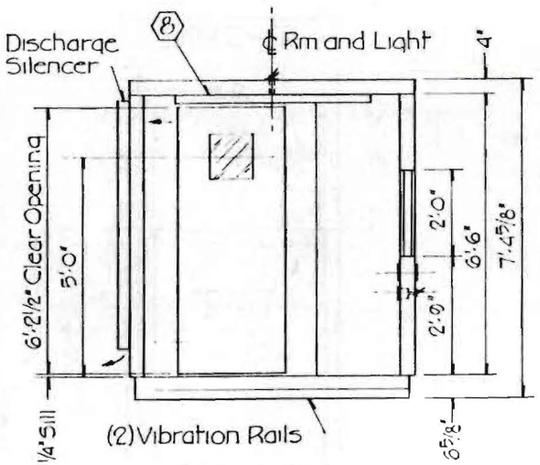
Plan Section

GENERAL NOTES:

1. TOTAL ESTIMATED DESIGN WEIGHT: 2,350 pounds.
2. PAINT FINISH: Note alternates (Check one)

	☐ A	☐ B	☐ C
Interior:	Sun. Yellow	Light Blue	Light Green
Exterior:	Sandalwood	Med. Beige	Med. Grey

3. LARGEST SIZE PANELS: 48"w x 78"H x 4" thick.
4. ELECTRICAL: All conduits, KO boxes, switches, ballast box, wires and wiring, not by IAC.
5. DOOR: (a) IAC 30"W x 74½"H clear opening with 12"W x 12"H double glazed window. (b) Doors for type No. 1 thru 8 may be hinged left or right. (c) Opposite door for room types 9 thru 20 will cause interference with V-100 silencer.
6. WINDOW: IAC 30"W x 24"H double glazed in wall.
7. (2) Vibration rails, each loaded for 1,175 pounds.
8. LIGHT FIXTURE: (1) Mercury No. M-106-240RS flourescent lamp with plastic cover. Flourescent light ballasts are to be removed and wired remotely.
9. BLOWER CHARACTERISTICS: 115 volts – single phase, 60 cycles – 24 watts each. V-100 blower silences
10. Audiometric jack panel consists of the following:
    Interior: (4) Switchcraft 12B Jax, (1) Cannon Conn. No. XLR 3 13N
    Exterior: (4) Switchcraft 12B Jax, (1) Cannon Conn. No. XLR 3 14N
11. Customer must assemble room on a flat and level floor area (± 1/4" in 10" non-cumulative).
12. Recessed duplex receptacle is rated for 15A, 115V, 60 cycles.



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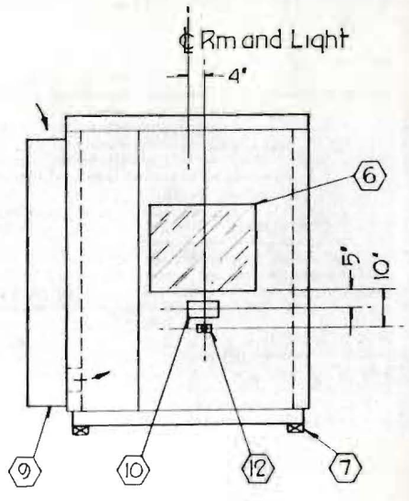


View "BB"

ISSUE	DATE	BY	DESCRIPTION OF ISSUE	CHK	APPD
A	7-21-72	RP	For approval	LEA	LEA

DESCRIPTION: IAC Schedule 40 Tape Recording Sound Isolation Room - Model No. 65

FOR:

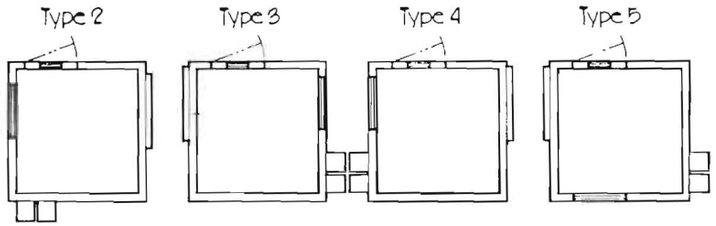
Industrial Acoustics Company, Inc.
1160 Commerce Ave., Bronx, N.Y. 10462

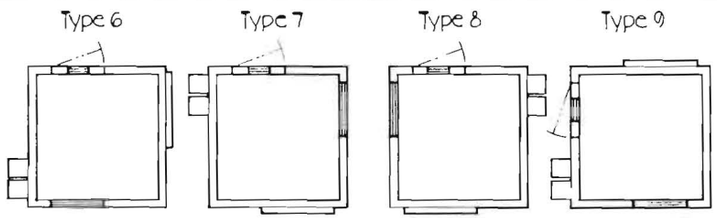
JOB No.:

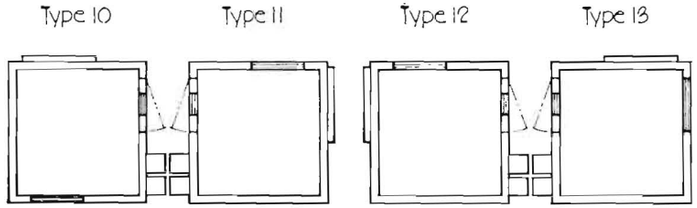
DRAWING No.: C62957-11

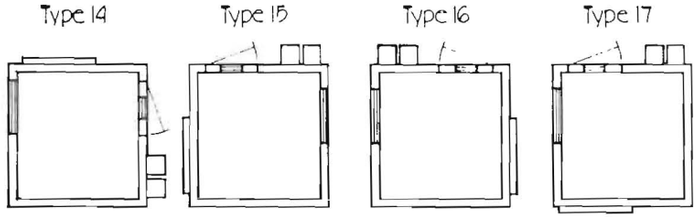
ISSUE: A

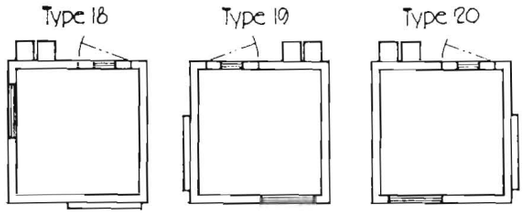
11 x 22

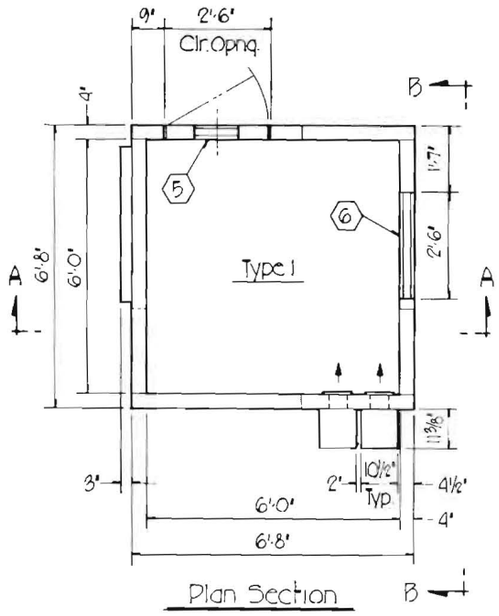


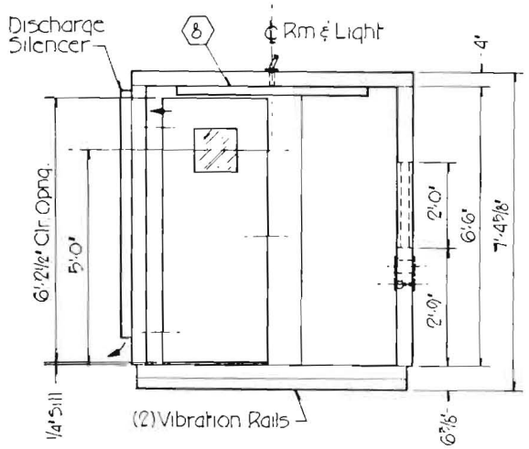


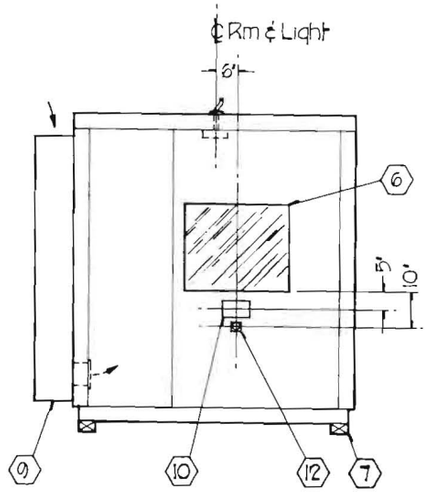












GENERAL NOTES:

1. TOTAL ESTIMATED DESIGN WEIGHT: 2,700 pounds
2. PAINT FINISH: Note alternates (Check one)

	□ A	□ B	□ C
Interior:	Sun. Yellow	Light Blue	Light Green
Exterior:	Sandalwood	Med. Beige	Med. Grey

3. LARGEST SIZE PANELS: 48"W x 80"H x 4" thick
4. ELECTRICAL: All conduits, KO boxes, switches, ballast box, wires and wiring, not by IAC.
5. DOOR: (a) IAC 30"W x 74-1/2"H clear opening with 12"W x 12"H double glazed window. (b) Doors for type no. 1 thru 8 may be hinged left or right. (c) Opposite door for room types 9 thru 20 will cause interference with V-100 silencer.
6. WINDOW: IAC 30"W x 24"H double glazed in wall.
7. (2) Vibration rails, each loaded for 1300 pounds.
8. LIGHT FIXTURE: (1) Mercury No. M-106-240RS fluorescent lamp with plastic cover. Fluorescent light ballasts are to be removed and wired remotely.
9. BLOWER CHARACTERISTICS: 115 volts – Single phase, 60 cycles – 24 watts each, V-100 blower silencer
10. Audiometric jack panel consists of the following:
    - Interior: (4) Switchcraft 12B Jax, (1) Cannon Conn. No. XLR-3-13N
    - Exterior: (4) Switchcraft 12B Jax, (1) Cannon Conn. No. XLR-3-14N
11. Customer must assemble room on a flat and level floor area (± 1/4" in 10" non-cumulative).
12. Recessed duplex receptacle is rated for 15A, 115V, 60 cycles.

ISSUE	DATE	BY	DESCRIPTION OF ISSUE	CHK.	APPD
A	6-6-73	RP	For approval		

DESCRIPTION: IAC Schedule 40 Tape Recording Sound Isolation Room - Model No. 66

FOR:

INDUSTRIAL ACOUSTICS COMPANY, INC.
1160 COMMERCE AVE., BRONX, N.Y. 10462

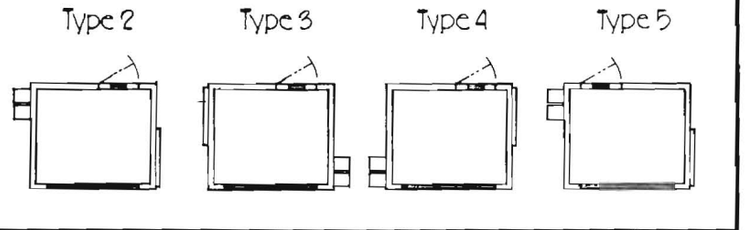
JOB No.:

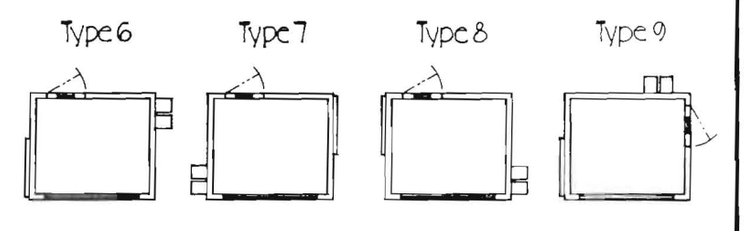
DRAWING No.: C62957-12

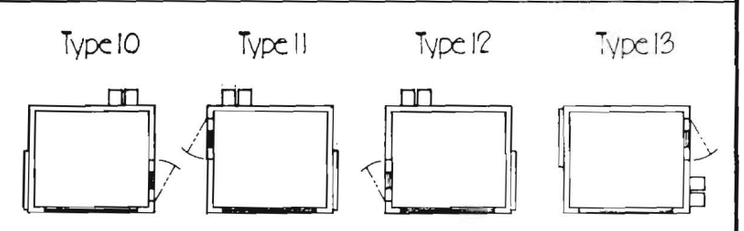
ISSUE: A

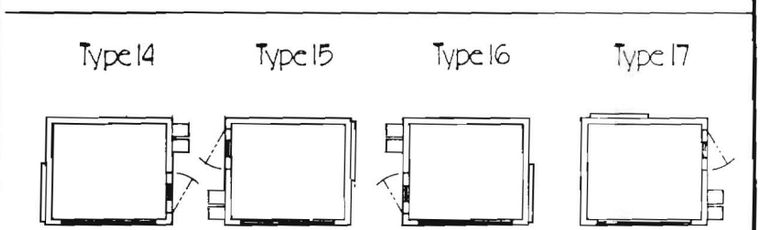
FILE No. BULLETIN 6.0130.0 (66)

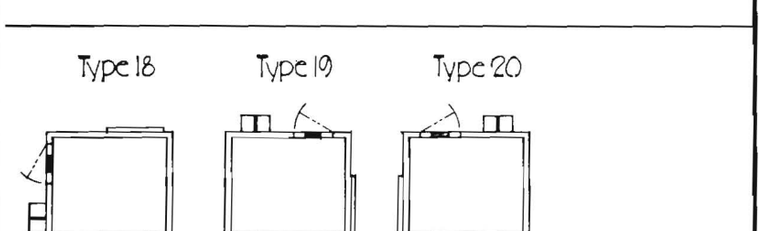
11 x 22

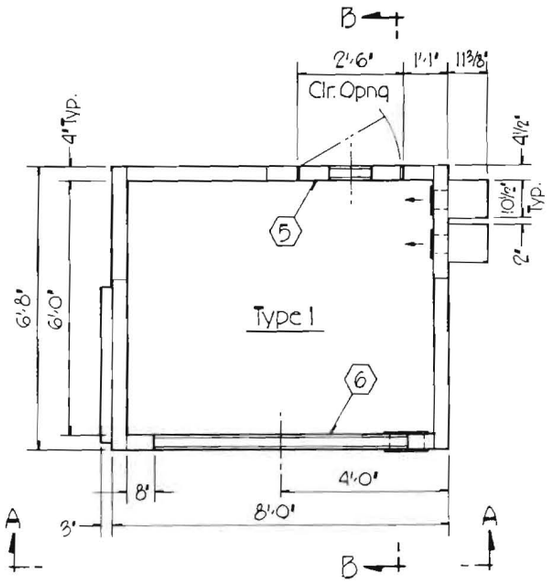




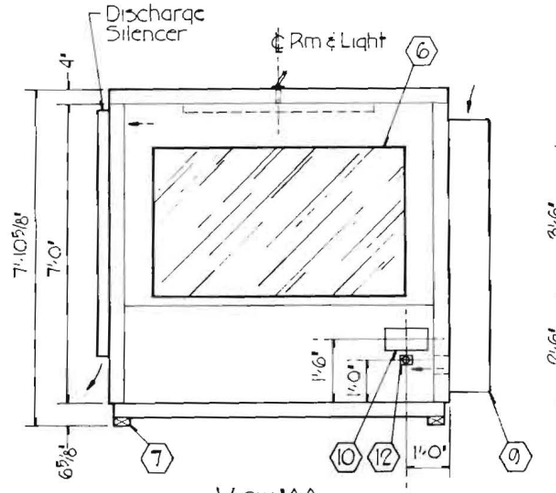








Plan Section



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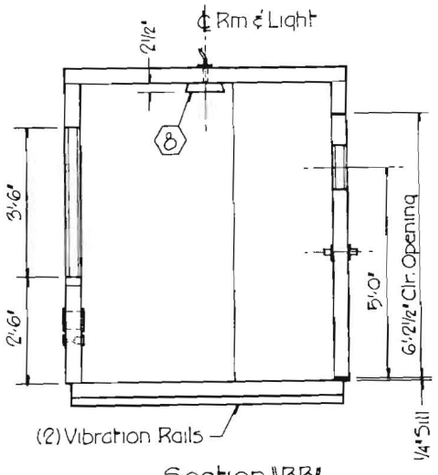


Section "BB"

GENERAL NOTES:

1. TOTAL ESTIMATED DESIGN WEIGHT: 3,200 pounds
2. PAINT FINISH: Note alternates (Check one)

	☐ A	☐ B	☐ C
Interior:	Sun. Yellow	Light Blue	Light Green
Exterior:	Sandalwood	Med. Beige	Med. Grey

3. LARGEST SIZE PANELS: 48"W x 96"H x 4" thick
4. ELECTRICAL: All conduits, KO boxes, switches, ballast box, wires and wiring, not by IAC.
5. DOOR: (a) IAC 30"W x 74-1/2"H clear opening with 12"W x 12"H double glazed window. (b) Doors for type no. 1 thru 12 may be hinged left or right. (c) Opposite door for room types 13 thru 20 will cause interference with V-100 silencer.
6. WINDOW: IAC 72"W x 42"H double glazed in wall.
7. (2) Vibration rails, each loaded to 1,550 pounds
8. LIGHT FIXTURE: (1) Mercury No. M-106-440RS fluorescent lamp with plastic cover. Fluorescent light ballasts are to be removed and wired remotely.
9. BLOWER CHARACTERISTICS: (2 Required) 115 volts – Single phase, 60 cycles – 24 watts each, V-100 blower silencer
10. Audiometric jack panel consists of the following:
    - Interior: (4) Switchcraft 12B Jax, (1) Cannon Conn. No. XLR-3-13N
    - Exterior: (4) Switchcraft 12B Jax, (1) Cannon Conn. No. XLR-3-14N
11. Customer must assemble room on a flat and level floor area (± 1/4" in 10" non-cumulative).
12. Recessed duplex receptable is rated for 15A, 115V, 60 cycles.

ISSUE	DATE	BY	DESCRIPTION OF ISSUE	CHK	APPD.
A	6-6-79	RP	For approval		

DESCRIPTION: IAC Schedule 40 Tape Recording Sound Isolation Room - Model No. 67

FOR:

INDUSTRIAL ACOUSTICS COMPANY, INC.
1160 COMMERCE AVE., BRONX, N.Y. 10462

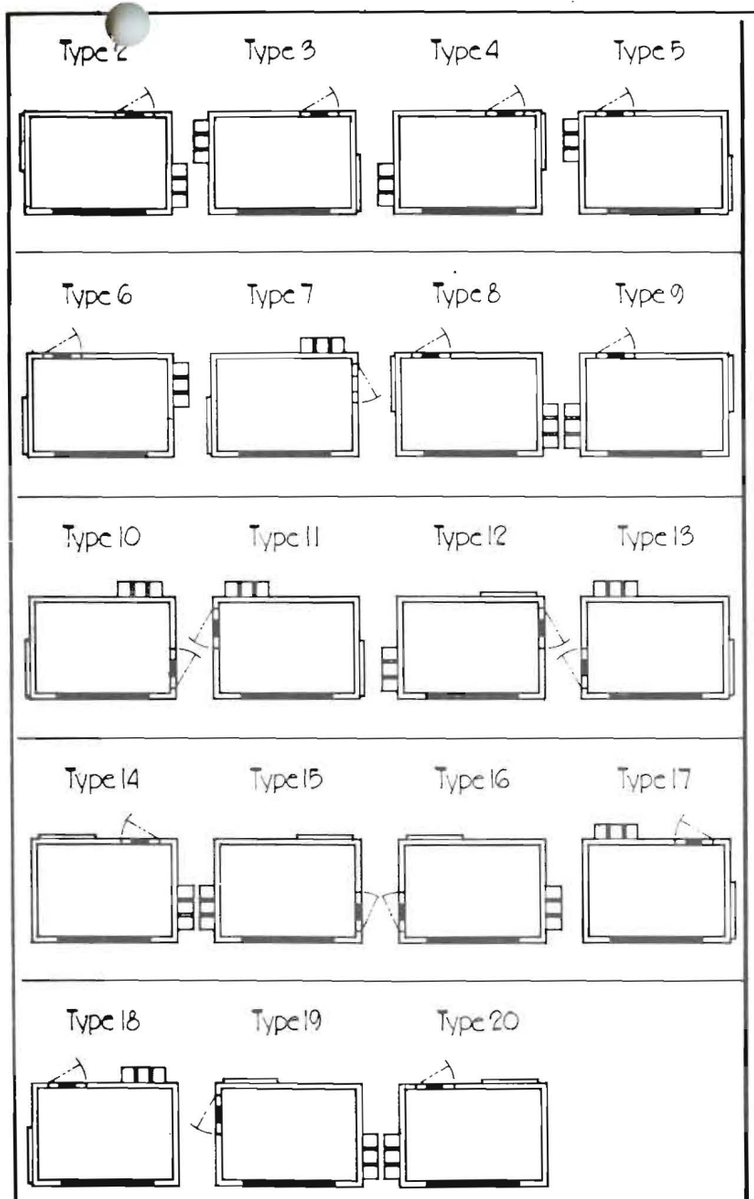
JOB No.:

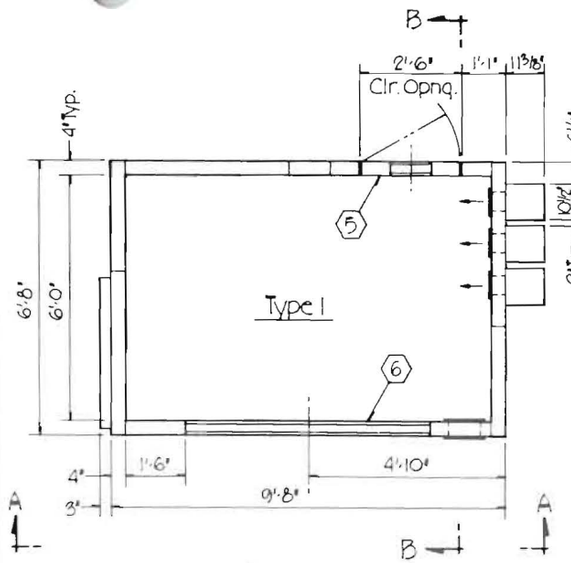
DRAWING No.: C62957-13

ISSUE: A

17 x 22

FILE No. BULLETIN 6.01300 (67)





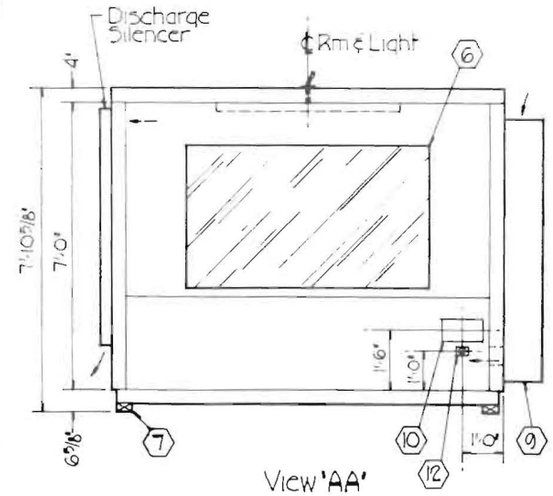
Plan Section

GENERAL NOTES:

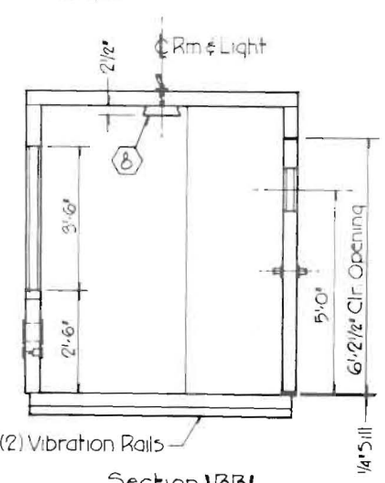
1. TOTAL ESTIMATED DESIGN WEIGHT: 3,700 pounds
2. PAINT FINISH: Note alternates (Check one)

	☐ A	☐ B	☐ C
Interior:	Sun Yellow	Light Blue	Light Green
Exterior:	Sandalwood	Med. Beige	Med Grey

3. LARGEST SIZE PANELS: 48"W x 116"H x 4" thick.
4. ELECTRICAL: All conduits, KO boxes, switches, ballast box, wires and wiring, not by IAC.
5. DOOR (a) IAC 30"W x 74-1/2"H clear opening with 12"W x 12"H double glazed window. (b) Doors for type No. 1 thru 16, 19, 20 may be hinged left or right. (c) Opposite door for room type 17 and 18 will cause interference with V-100 silencer.
6. WINDOW: IAC 72"W x 42"H double glazed in wall.
7. (2) Vibration rails each loaded for 1,750 pounds
8. LIGHT FIXTURE. (1) Mercury No. M 106 440RS fluorescent lamp with plastic cover. Fluorescent light ballasts are to be removed and wired remotely.
9. BLOWER CHARACTERISTICS: (3 Required) 115 volts — Single phase 60 cycles — 24 watts each V-100 blower silencer
10. Audiometric jack panel consists of the following.
    Interior: (4) Switchcraft 12B Jax (1) Cannon Conn. No. XLR 3-13N
    Exterior: (4) Switchcraft 12B Jax (1) Cannon Conn. No. XLR 3-14N
11. Customer must assemble room on a flat and level floor area (± 1/4" in 10" non-cumulative).
12. Recessed duplex receptable is rated for 15A, 115V, 60 cycles.



View 'AA'



Section 'BB'

ISSUE	DATE	BY	DESCRIPTION OF ISSUE	CHK.	APPD.
A	6-6-73	RP	For approval		

DESCRIPTION: IAC Schedule 40 Tape Recording Sound Isolation Room - Model No. 69

FOR:

INDUSTRIAL ACOUSTICS COMPANY
1160 Commerce Ave., Bronx, N.Y. 10462

JOB No.:

DRAWING No.: C62057-14

ISSUE: A

17 x 22

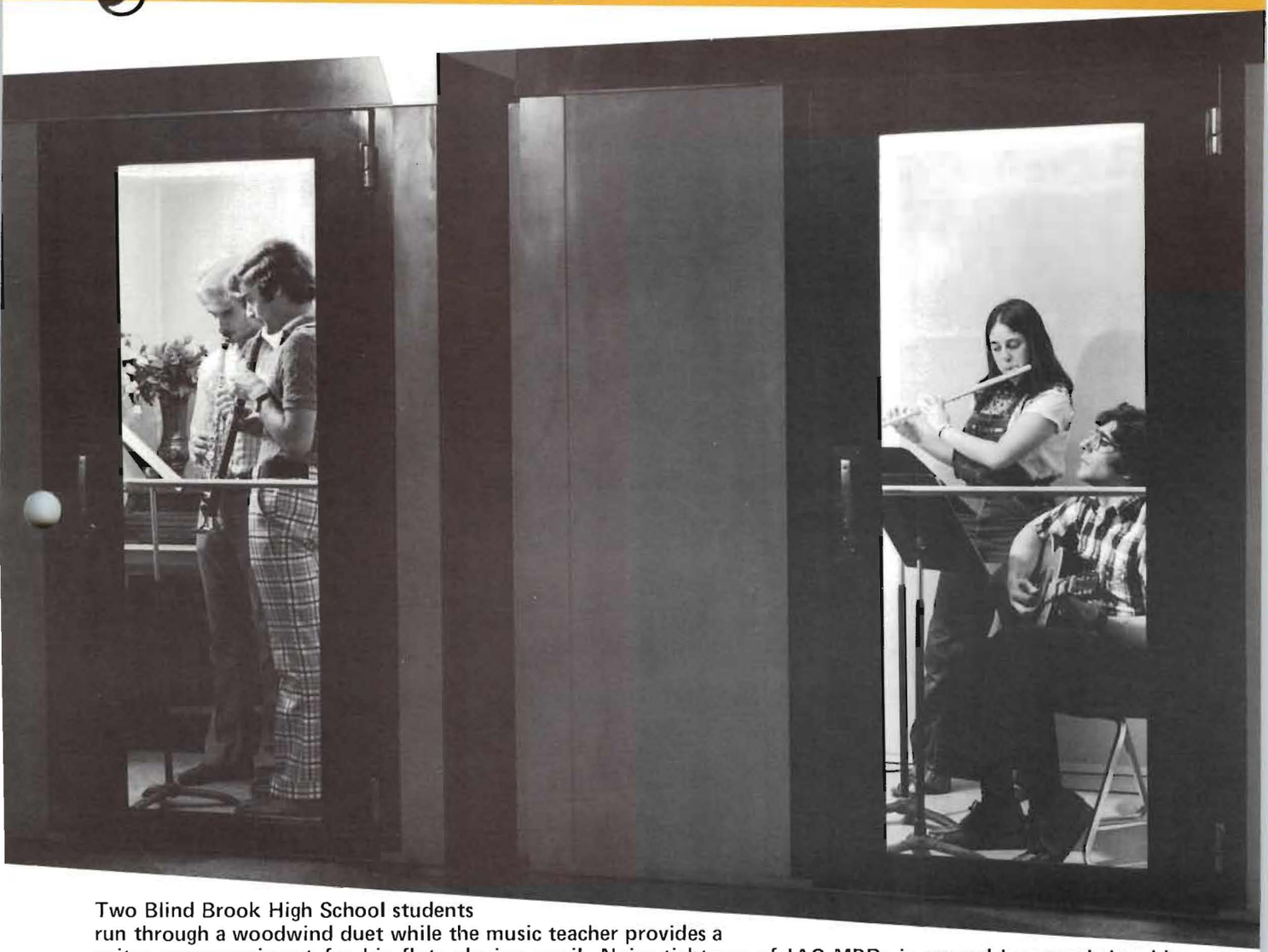
IAC Music Practice Rooms

Theme and Variations

Bulletin 3.1201.0

at Blind Brook High School

Controlled Acoustical Environment Harmonizes Musical Discord



Two Blind Brook High School students run through a woodwind duet while the music teacher provides a guitar accompaniment for his flute-playing pupil. Noise tightness of IAC MPRs is assured by sound-absorbing labyrinth joiners for compatibility between room components and for prevention of alignment problems.

EXPOSITION

Not too long after Blind Brook High School (Port Chester, New York) opened, faculty and students alike became aware that the absence of an appropriate acoustical environment was proving detrimental to the teaching and practice of instrumental music. The following factors pointed up the lack of such an environment:

One, the building's interior walls were formed from sound-reflective concrete block which produced an annoying reverberant effect. Two, there was no acoustical privacy when several students playing a variety of instruments wanted to practice at the same time. Three, sounds of vocal music immediately adjacent to the instrumental-music instructional area created a dissonant atmosphere in which teacher and students found it difficult to determine pitch, rhythm, and intonation.

DEVELOPMENT

In looking for a solution to this problem, school administrators investigated Concert Series Music Practice Rooms designed and manufactured by Industrial Acoustics Company. The officials learned that the engineering of these rooms mixes "hard" or sound-reflective modular components with "soft" or sound-absorptive components. In this way, "liveness" or reverberation time is controlled, thus establishing an environment suitable for the required room function.

Available in a series of standard models individually sized to accommodate comfortably two, three, four, five, or six musicians, IAC MPRs combine a high degree of noise isolation and a controllable acoustical environment. Their sound-transmission-loss and sound-absorption properties create surroundings well-suited to the practice of instrumental music; a fact supported by data certifying the rooms' acoustical performance which IAC supplied school officials.

All MPRs have a Noise Isolation Class (NIC) rating (a measure of a room's noise reduction characteristics) of not less than 43 decibels from room to corridor and as high as NIC 67 on a room-to-room basis. Their perforated interior component surfaces have a tested sound-absorption coefficient of 0.95, meaning 95% of sound energy incident to the surface is absorbed.

This combination of fixed and controllable acoustical features promoted installation of two "Duet-Sized" Music Practice Rooms in an alcove between the music teacher's office and an entrance to the auditorium where vocal music is rehearsed.

CODA

How the IAC MPRs have overcome a serious handicap to development of the artistic interests of members of Blind Brook High's student body can be seen in observations of pupils and faculty. A budding flutist commented that before the school had the MPRs, she like other students in the band had to practice wherever she could find a relatively quiet corner. The young musicians of a clarinet and oboe duo enjoy playing even more now because each can tootle away to his heart's content undisturbed and undisturbing.

The music teacher says the rooms are beneficial as they enhance his capacity for working on the musical skills of different instrumentalists in the same instructional period. And the assistant principal reports the IAC MPRs have made it possible to carry on the instrumental-music program without sound interference from choral-music rehearsals next door.

Acoustic ratings on fully assembled Music Practice Rooms were tested out in a 10,000 cu ft reverberant chamber, a major part of IAC's lab-testing facilities for such rooms.

INDUSTRIAL ACOUSTICS COMPANY
Bronx, New York 10462 · 1160 Commerce Avenue · Phone (212) 931-8000 · Telex 12-5880
Santa Monica, California 90406 · P.O. Box 1158 · Phone (213) 393-0265 · Telex 65-2417
Staines, Middlesex, England, Walton House, Central Trading Estate · Staines 56251 · Telex (101) 25-518
4055 Niederkrüchten, Germany · Phone (02163) 50 38, 50 39 · Telex 852261
REPRESENTATIVES IN PRINCIPAL CITIES

YOUR IAC REPRESENTATIVE

PRINTED IN U.S.A.

RONALD MOULDER
Consultant in Acoustics

ACOUSTICAL FIELD TESTS

IAC MUSIC PRACTICE ROOMS

Report No. 976-3
Sept. 15, 1976

INTRODUCTION

This report documents our findings concerning the acoustical tests conducted at Denison University, Granville, Ohio. All tests were supervised and witnessed by the undersigned.

PURPOSE OF TESTS

1. To determine the noise reduction (NR) and noise isolation class (NIC) rating for Industrial Acoustics Corporation (IAC) music practice rooms for the following test configurations:

   a. In to out (module to corridor).

   b. Room to room (module to module) with a 12 in. (305 mm) spacing between modules.

2. To measure the ambient sound pressure levels (SPL) within the module, with the ventilation equipment operating normally.

465 Kelley Lane, Newark, Ohio 43055 (614) 366-5394

DESCRIPTION:

The IAC Music Practice Rooms used in this test program were two (2) idential assembled standard Trio models with outside dimensions of 116 in. (2900 mm) wide by 84 in. (2100 mm) long by 94 in. (2350 mm) high and one (1) Quartet model with outside dimensions of 128 in. (3200 mm) wide by 120 in. (3000 mm) long by 94 in. (2350 mm) high. Each Trio unit weighed 3400 lb. (1550 kg) and the Quartet unit weighed 4700 lb. (2130 kg). Wall and ceiling panels were constructed of 16 gauge solid steel outer surface and 16 gauge solid or 22 gauge perforated interior surfaces. Perforations consisted of 3/32 in. (2.34 mm) holes on 3/16 in. (4.69 mm) staggered centers. Panel surfaces were welded to a steel frame filled with sound absorbing and dampening elements to form a 4 in. (100 mm) thick panel. Ventilation panels were of solid 16 gauge steel surface on both sides of similar welded construction and contained a sound absorbing silencer section resulting in a 6 in. (150 mm) panel thickness.

One intake and one discharge silencer panel formed a portion of the walls of each room and were connected to the building air conditioning ducts. Ventilation systems were in complete operating condition during the entire test procedure. Each module contained an out-swinging door with clear opening of 36 in. (900 mm) wide by 79 1/2 in. (2000 mm) high. Each leaf contained a 27 in. (675 mm) wide by 74 1/2 in. (1850 mm) high double glazed window. Each leaf was operating on two IAC cam-lift hinges. Double magnetic/absorptive seals were used in the jamb and head of door assemblies with compression seals at floor. Sills were flush with no raised threshold. Doors were in complete operating condition during test. Floors were 4 in. (100 mm) thick, constructed of solid 11 gauge steel top surface and 16 gauge bottom surface welded to a steel frame and filled with sound absorbing elements. Floors rested on vibration isolators rated to give each module a natural frequency of 6 1/4 Hz. Floors were carpeted with 1/4 in. (6.25 mm) thick pile rug with foam backing. Each room was painted on interior and exterior surfaces. The rooms were spaced nominally 12 in. (305 mm) apart.

STANDARDS

Noise Reduction (NR) measurements were made in accordance with the American Society for Testing and Materials (ASTM) Standard E336-71, Standard Recommended Practice for the Measurement of Airborne Sound Insulation in Buildings. All microphone stations, within the module, were kept at 43 in. (1075 mm) off of the floor (ear level of sitting subject) at the approximate geometric center of the module. All measurements were made using octave band filters in the microphone circuit. When the module was used as a Source Room (in either "in-out" or "module-to-module" configuration) two speakers were used in two adjacent corners to create as uniform as possible a diffused sound field, throughout the volume of the module.

Noise Isolation Class (NIC), single number ratings were established from the octave band NR data in accordance with the ASTM Standard E413-70T as specified in Standard E336-71.

RESULTS

Attached are four graphs showing the ambient sound pressure levels in the music practice room (Graphs No. 1 and No. 2) and the in-to-out and room-to-room noise reduction values (Graphs No. 3 and No. 4 respectively).

Respectfully submitted,

Ronald Moulder

Ronald Moulder
Consultant

RM:rl

Attach:

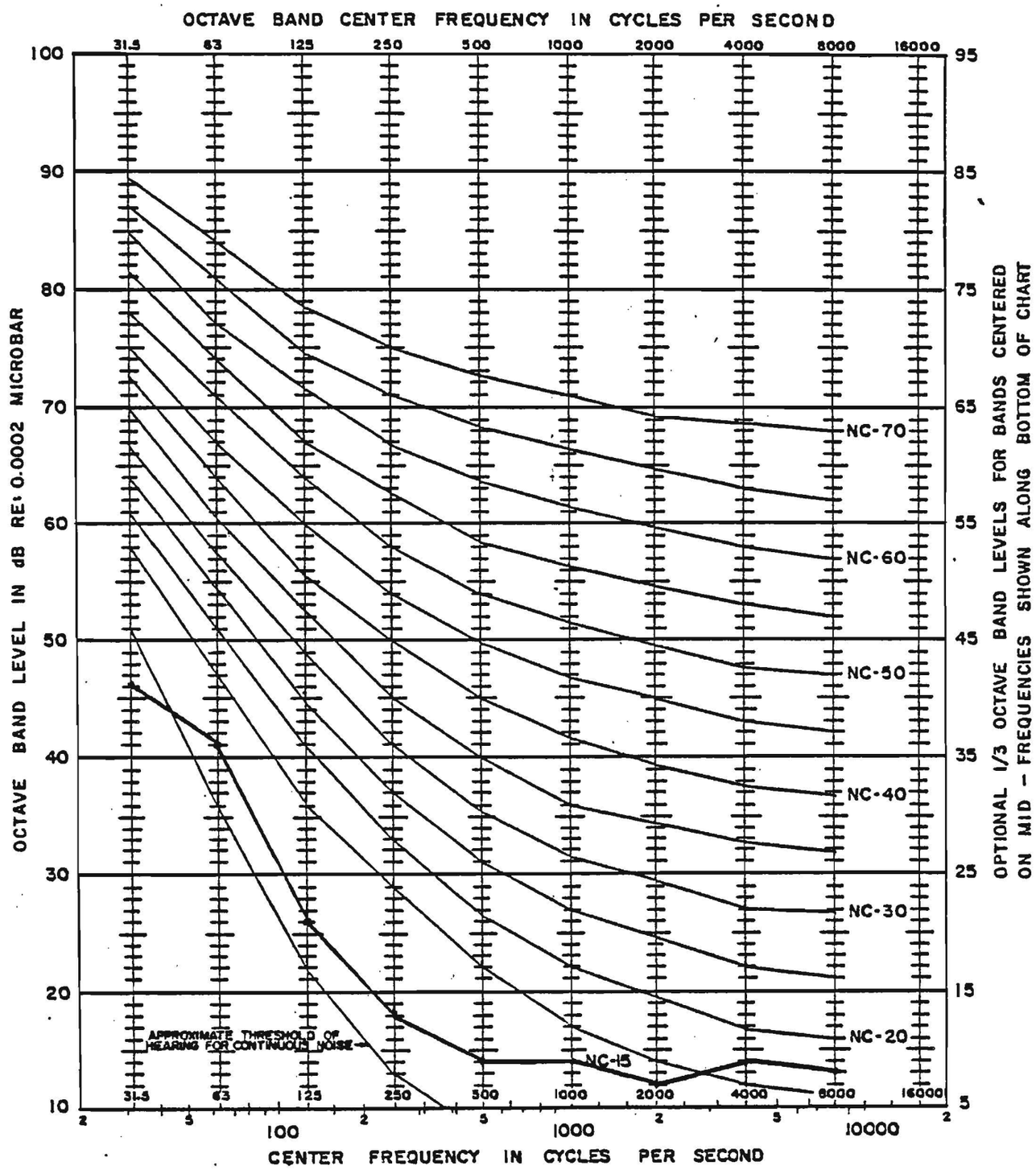
465 Kelley Lane, Newark, Ohio 43055 (614) 366-5394

GRAPH NO. 1

RONALD MOULDER
Consultant in Acoustics

IAC - Music Practice Room

JOB 976-3 BY R. M. DATE 9-15-76 SHT. 2 OF 2



Ambient Noise Level in Music Practice Room — HVAC Unit on, Lights off

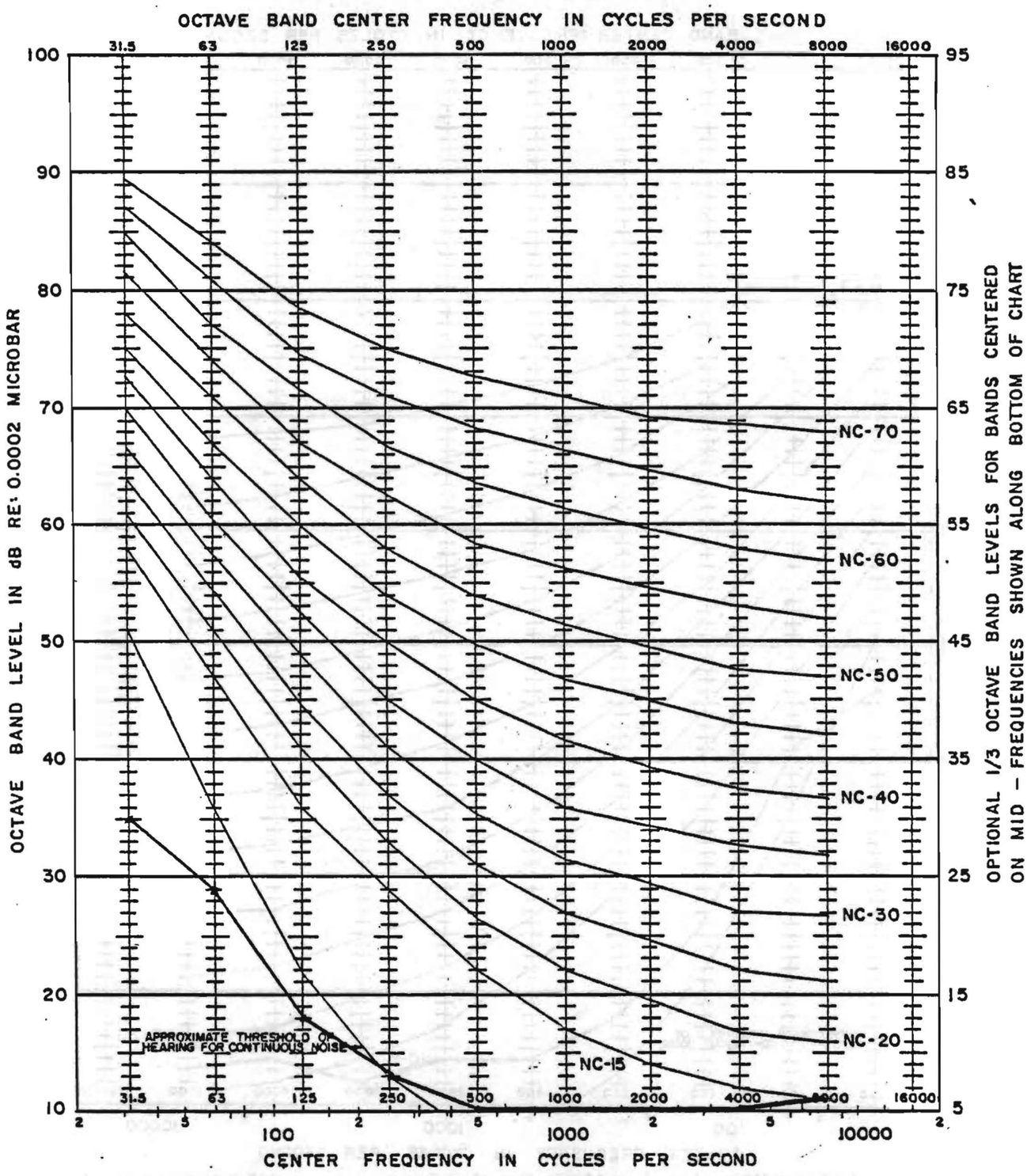
NC 17

GRAPH NO. 2

RONALD MOULDER
Consultant in Acoustics

IAC - Music Practice Room

JOB 976-3 BY R. M. DATE 9-15-76 SHT. 1 OF 2



Ambient Noise Level in Music Practice Room — HVAC Unit off, Lights off

NC <15

RONALD MOULDER
Consultant In Acoustics

TEST NO. 3
DATE 9-15-76

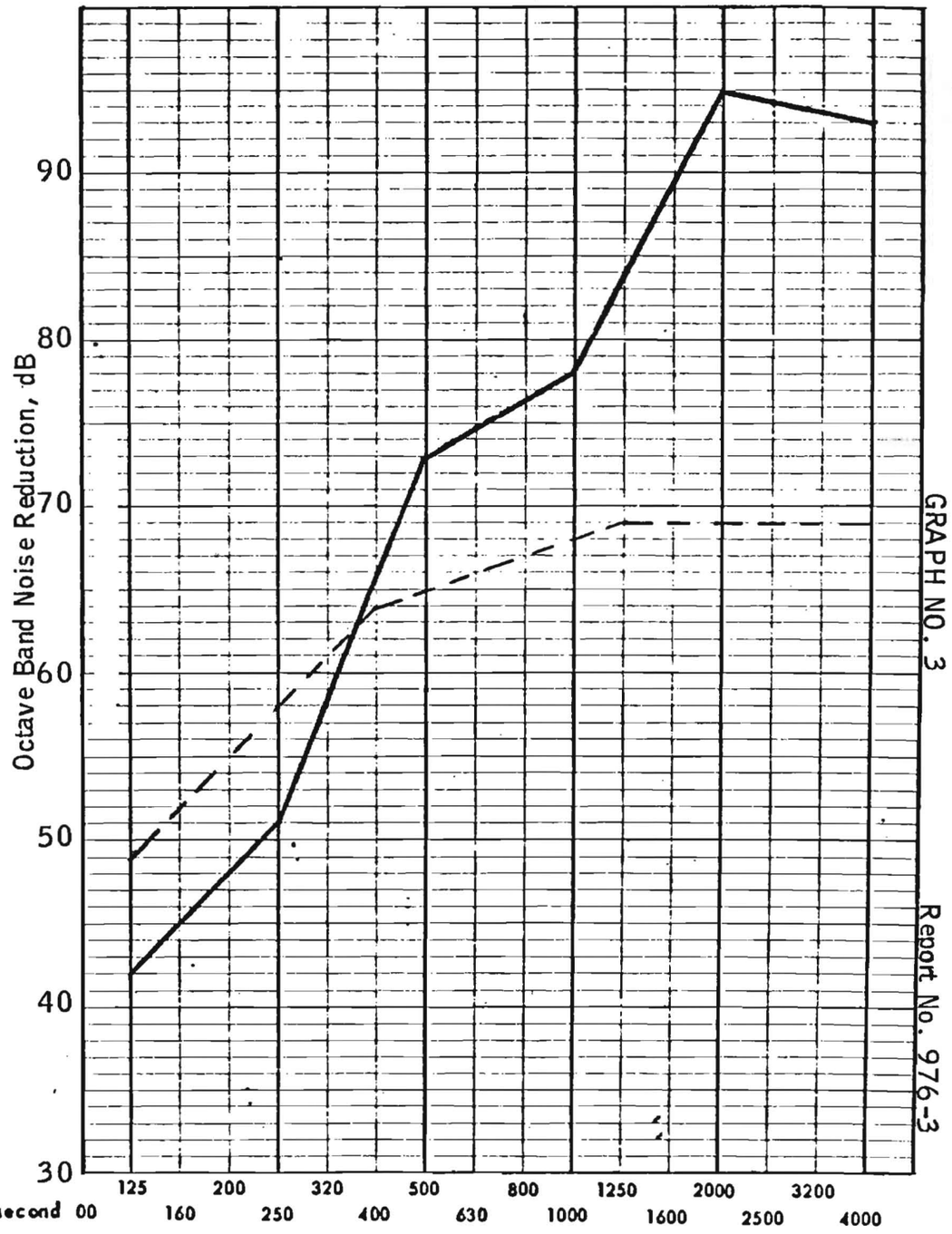
Sample Tested: Noise Reduction

Between IAC Music Practice Room
No. 2 and Room No. 1

Denison University
Burton Hall

NIC 65 *

* Based on Octave Band data.



GRAPH NO. 3

Report No. 976-3

18-60-6778

RONALD MOULDER
Consultant In Acoustics

TEST NO. 1
DATE 9-15-76

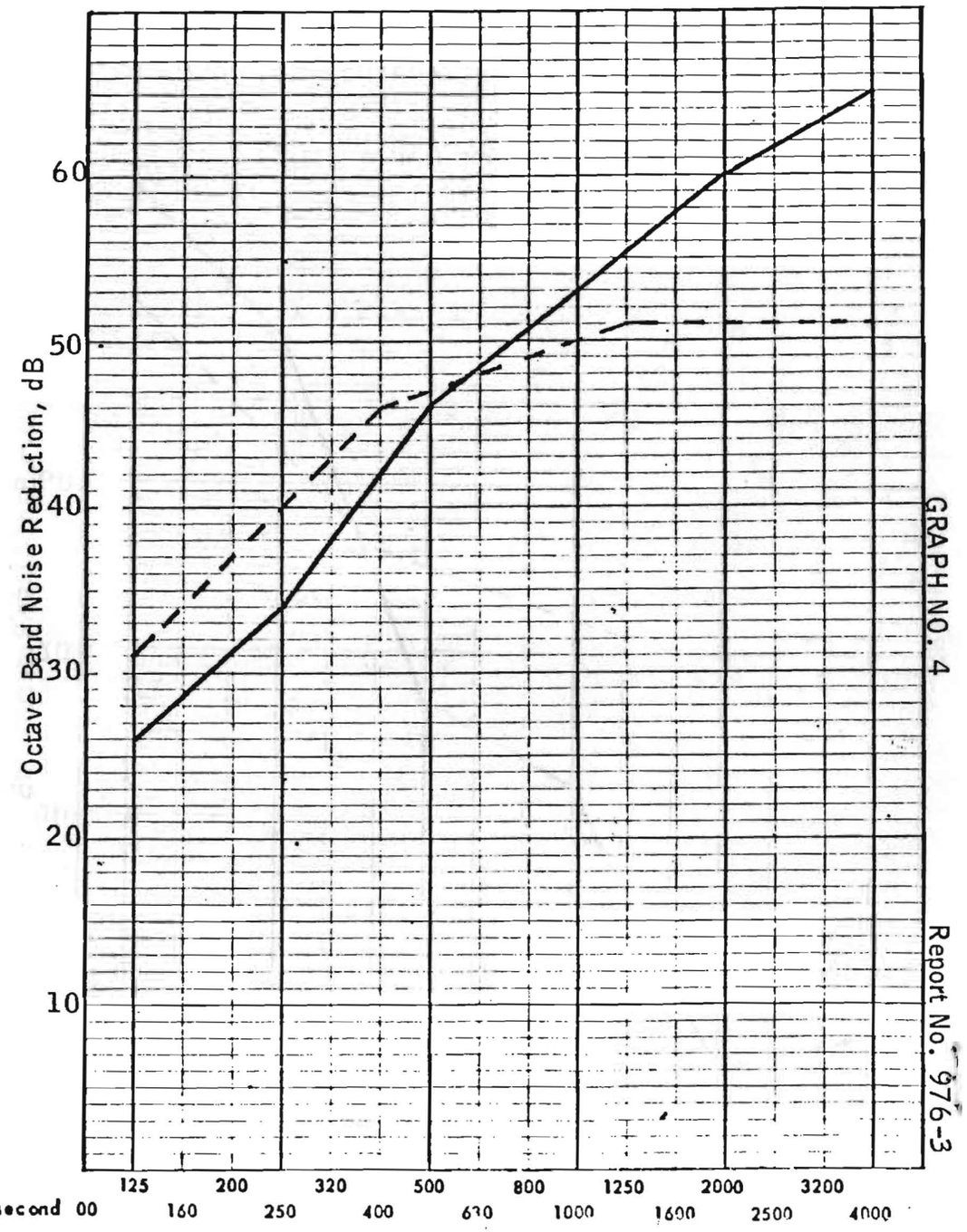
Sample Tested: Noise Reduction

Between IAC Music Practice Room
No. 2 and the Corridor

Denison University
Burton Hall

NIC 47*

* Based on Octave Band data



GRAPH NO. 4

Report No. 976-3

IAC NOISE CONTROL

HERE'S HOW

AT AMERICAN FORCES RADIO AND TELEVISION SERVICE.... IAC MODULINE PROVIDES IDEAL ACOUSTIC ENVIRONMENT FOR NEW BROADCASTING STUDIO

Armed Forces Radio was faced with special problems when they decided to build new broadcast origination studios in Washington. An acoustical-consulting and manufacturing firm was called in to help.

NO ONE SERVING in the Armed Forces of the United States need go about his duties unaware of the day-to-day current of world events. Such is the mission of the American Forces Radio and Television Service, an agency of the Office of Information for the Armed Forces of the Defense Department.

The agency utilizes a broad information program through various broadcast facilities located at several points throughout the country. One of these outlets for keeping military personnel in daily contact with the world scene is AFRTS-Washington. This branch was established in 1965 to improve the flow of general and seat-of-government news through internal Department of Defense media. Its purpose is to supply timely and accurate news and informational reports, direct from the nation's capitol and from all over the globe, programmed over a 24-hour broadcast day and beamed to those thousands of places where American servicemen are stationed. To accomplish its mission, AFRTS-Washington utilizes shortwave, direct-program circuits, and teletype.

The first of these media provides live-voice broadcasts and is the only armed-forces radio facility available to military personnel in isolated outposts and aboard ships at sea.

In addition to shortwave, direct-program circuits connect AFRTS-Washington to many AFRTS networks and stations in Europe, the Pacific, and the Far East. Some of these circuits provide two-way communications, thus enabling return capability for administrative and operational information from the overseas station to the Washington office. Direct-communications circuits are used to provide optimum reliability eliminating propagation variances.

The direct teletype facilitates communication between AFRTS-W and most AFRTS networks and stations overseas. News and information, such as program-schedule changes, pertinent to the agency's operations are transmitted by teletype.

The studios of AFRTS-W are located in a new 12-story conventional office building leased by the Federal Government from private owners. When AFRTS-W prepared to occupy the structure in Arlington, Virginia, not far from the Pentagon, it had to modify the space to meet specialized requirements for broadcasting studios.

Contact was made by the chief engineer of AFRTS-W with Industrial Acoustics Company, Inc., of New York, a firm involved in designing and building acoustical noise-suppression equipment. AFRTS-W supplied the studio layout

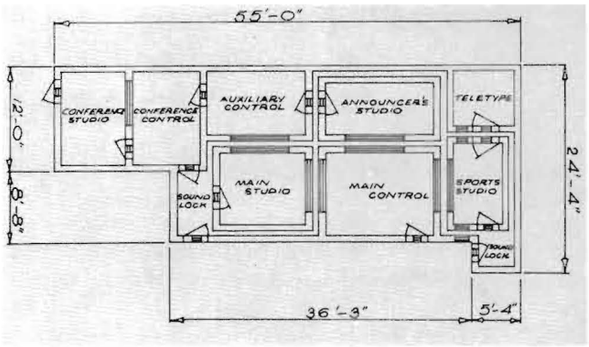


Figure 1. Layout of studios and control at AFRTS-Washington. The complete soundproof studio rooms including walls, floor, ceilings and doors were constructed with the IAC Moduline® component system of acoustic structures.

and the acoustical parameters for these chambers—conference studio, conference control room, announcers studio, auxiliary control room, main studio, main control room, sports studio, teletype room, plus two sound locks.

Consideration for conventional studio construction was ruled out because of floor load capacity, time for construction, and excessive floor space required. Further, conventional construction would not provide the required mobility, if it would become necessary to relocate the studios.

Selected as the outfitting materials best able to do the job were modular acoustical components made up of pre-engineered and acoustically rated noise-control panels. From these units, called the *IAC Moduline System*, a broadcast facility was designed as a building-within-a-building answering these important criteria.

Figure 2. A fish-eye view through an acoustical door into a portion of one of the studios.

This is an actual application feature article which appeared in the August, 1970 issue of **db** magazine.

1. All sections could be assembled or disassembled in minimal time.

2. The over-all weight of the eight Moduline-System chambers would be well below the load capacity of the office building.

3. Adequate working space would be provided.

4. Reliable acoustic performance was assured.

In deciding upon the Moduline-System panels, the AFRTS chief engineer was guided by two principal factors—sound isolation and reverberation time. In the acoustical environment desired for the broadcast facility, it was specified that the noise levels within the complex should not exceed NC-20, and the reverberation time would be 0.34 seconds within the sports, announcers, and main broadcast studios. To be certain before installation that the Moduline panels would meet these specifications, IAC made an octave-band analysis of noise levels at the site. From this investigation, they recommended that the walls of the above studios be of double-wall construction and single-wall for the remaining chambers. Also it was proposed to vary panel construction so the studios could be calibrated to achieve the required reverberation time.

Now for a look at the way the Moduline panels forming the roof and walls of the structure are put together to achieve their acoustical properties. All of them are four-inch-thick, variable-absorption units whose face sheets are either 22-gauge cold-rolled steel perforated with openings 3/32-in. diameter, or solid 16-gauge steel. The assembled panels are steel reinforced and filled with sound-retarding and sound-absorbing fills. These are inert, noncombustible, mildew-resistant, and verminproof. Each face sheet is welded and riveted to the panel assembly to acoustically compress and hold the filler in place.

The floor panels, whose design weight is 20 pounds per square foot, have an 11-gauge hot-rolled steel wearing surface and a 16-gauge steel back sheet. Each panel is structurally reinforced and welded to form a rugged assembly. Not affixed directly to the floor of the office building, the studios' floor rests on properly loaded vibration-isolator rails which have a natural frequency of less than seven hertz.

And since weight was a basic factor for the studio structure so as not to place loading stress on the office building, the panels checked in with an average poundage for the floor units of 18 lbs. per sq. ft. and 7 lbs. per sq. ft. for the wall, ceiling, and door panels.

In putting the panels together to form the broadcast complex, care was taken to spot weld each 16-gauge-steel panel joiner every two inches along its length. This procedure was

Figure 3. The main studio as it is in use. Main control is on the right with the sports studio just visible through it. On the left, the view is into an auxiliary control room.

carried out to prevent noise leakage when acoustically and structurally joining the panels. Each joiner is formed to create a labyrinth that will allow no direct passage of noise.

Furthermore, since the acoustical properties of the studios could be compromised by inadequately designed entrances, the company supplied 2½ inch thick soundproof doors outfitted with cam-seal hinges. The advantage of these is that they supply a sure compression seal between the door and its frame. When the door is opened, the cam action of the hinge smoothly lifts the door leaf, releasing the seal; but when it is closed, this hinge automatically lowers the compressing bottom seal tightly against the floor. This provides a positive acoustic seal every time the door closes, eliminating the need for unsafe raised sills, drag seals, and unreliable threshold closures.

To complete the acoustical picture, IAC also did away with noise from the air-conditioning through installation in the system of its *Quiet-Duct* and *Tranquil-Aire* silencers.

Since the studio complex has been in operation, its staff has had ample opportunity to find out how the enclosures are working out. The announcers have been impressed with the lack of distortion in voice transmission; it is not too live, but neither is it dead, the level being just right for broadcasting purposes. This is especially significant since all the studios are rectangular, there being no skewed walls to assist in the maintenance of a low reverberation factor. And once inside the broadcast area, the casual observer becomes quickly aware of the absence of surface noise and of the disappearance of the whine and vibration of low-flying jets coming in for landings at nearby National Airport.

Thus with these modern, acoustically-perfected facilities, American Forces Radio and Television Service-Washington continues its daily objective of keeping military personnel up-to-date. ■

No matter what the noise problem, contact your IAC Tech-Rep. He is ready to provide you with a practical and economical solution backed by IAC's experience gained in thousands of noise control installations.

Bulletin 6.0501.3

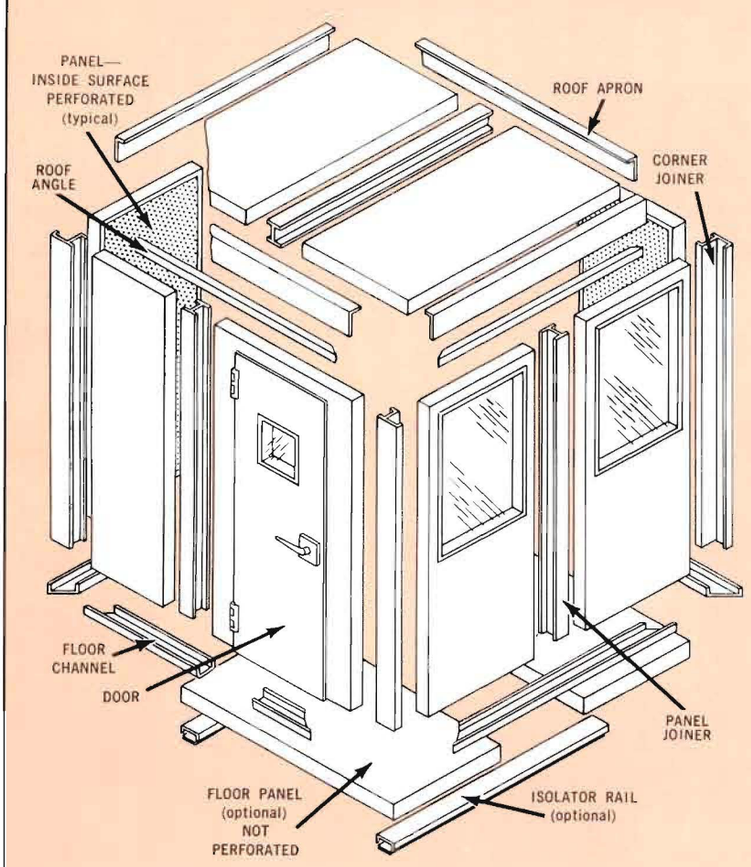
noise control for business and industry

iac moduline®

"do-it-yourself" acoustic structures
with **NOISHIELD** and **NOISE-LOCK** panels

ASSEMBLE SOUNDPROOF ENCLOSURES OF PRE-ENGINEERED COMPONENTS, SAVE UP TO 40% OVER SPECIAL DESIGNS!

EXPLODED VIEW OF A MODULINE ENCLOSURE



ABBREVIATED INSTALLATION INSTRUCTIONS

1. Place floor channels in lengths needed for room perimeter. Anchor to floor.
2. Starting at a corner install panels and joiners to make up walls.
3. Install roof angles. Place ceiling panels and joiners. Finish off with external roof apron.
4. Hang and adjust doors. Install accessory items; i.e., forced vent-system and electrical work.

WHY ACOUSTICALLY CONTROLLED AREAS ARE NECESSARY...

INDUSTRIAL NOISE CONTROL

- **ELIMINATE HAZARDOUS NOISE EXPOSURE**
- **INCREASE PRODUCTION AND QUALITY**

IAC noise control is a highly effective safeguard against the mounting compensation claims caused by noise-induced hearing loss. It helps reduce accidents and improve production by facilitating communications.

PRODUCT TEST & DEVELOPMENT

- **PROVIDE THE CORRECT ACOUSTIC ENVIRONMENT FOR TESTING AND DEVELOPMENT**
- **IMPROVE PRODUCT QUALITY CONTROL**

The quieter product has the best chance of winning the market. An IAC MODULINE acoustic room is a keystone in building quieter products.

NEW IAC MODULINE SYSTEM IS THE ANSWER TO YOUR NEEDS!

The IAC MODULINE "do-it-yourself" system provides a swift, effective and economical solution to noise problems. Wherever noise is to be contained or blocked out, these rugged structures give maximum performance at minimum cost. ■ With the MODULINE system, you purchase components pre-engineered by IAC, ready for quick assembly into heavy-duty acoustical structures. No special tools needed. The structure may be easily demounted or modified for optimum utilization—with no loss of acoustic properties! Only two men are needed to handle MODULINE panels. Easy-to-follow installation instructions are provided. ■ We also welcome your inquiries for fully custom-engineered installations including anechoic and reverberant rooms.

moduline's standard components for a wide range of needs.....

VERSATILITY OF USE — All MODULINE panels are interchangeable with others of the same size, regardless of wall or ceiling location. They are shipped ready for immediate assembly. MODULINE components are made of cold-rolled and galvanized steel. Cold-rolled surfaces are prime coated. ■ The panels are 4″ thick and are available in **widths** of 16″, 36″ and 48″. Normal **widths** of assembled structures range from 60″ through 288″, in 12″ increments. ■ Heights of panels available in each width are: 84″, 96″, 120″ and 144″. Heights may be increased by stacking panels. Special sizes of panels can also be furnished. ■ Where vibration is present, a structurally isolated MODULINE floor is recommended with a maximum **floor width** of 144″. However, excellent results are often attainable using an existing floor.

TWO PANEL TYPES — MODULINE panels are available in two types to meet varying acoustic requirements. Both types provide excellent acoustical **and** thermal insulation.

■ NOISHIELD® PANELS: For simple walls, screens, partial and complete rooms and enclosures. More than adequate noise reduction for many applications.

■ NOISE-LOCK® PANELS: A high performance acoustic panel. For complete rooms and enclosures where more noise reduction is required.

OTHER COMPONENTS — Doors, floors, windows, ventilation units and silencers, panel joiners, trim and hardware are furnished in acoustically compatible design.

TYPICAL APPLICATIONS — Movable Sound Baffles ■ Quiet Rooms ■ Quality Control and Equipment Test Rooms ■ Product Development Rooms ■ Acoustic/Thermal Fan Plenums ■ Quiet Havens ■ Communication Centers ■ Control and Observation Rooms ■ Power Plant Offices ■ Marine and Dredger Cabins ■ Traffic Control Centers ■ Supervisory Offices ■ Recruiting and Interviewing Offices ■ Vibration Test Enclosures ■ Soundproof Partitions ■ Construction Offices ■ Tool Cribs ■ First-Aid Stations.

ACOUSTICAL & THERMAL CHARACTERISTICS OF MODULINE SYSTEM PANELS

TRANSMISSION LOSS IN DECIBELS

Octave Band Center Frequencies, Hz	63	125	250	500	1000	2000	4000	8000	"U" FACTOR
Noishield	26	23	30	42	51	59	58	>58	.07
Noise-Lock	30	28	34	40	48	56	62	>62	.07

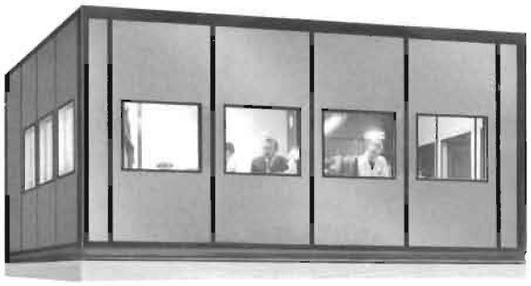
More information on acoustic performance of Moduline System Panels is contained in Bulletin 6.0502.1 (Acoustics Section.)

SOUND ABSORPTION CHARACTERISTICS*

Octave Band Center Frequencies, Hz	125	250	500	1000	2000	4000	8000	NRC
Absorption Coefficients	0.89	1.20	1.16	1.09	1.01	1.03	0.93	(1.10) 0.95

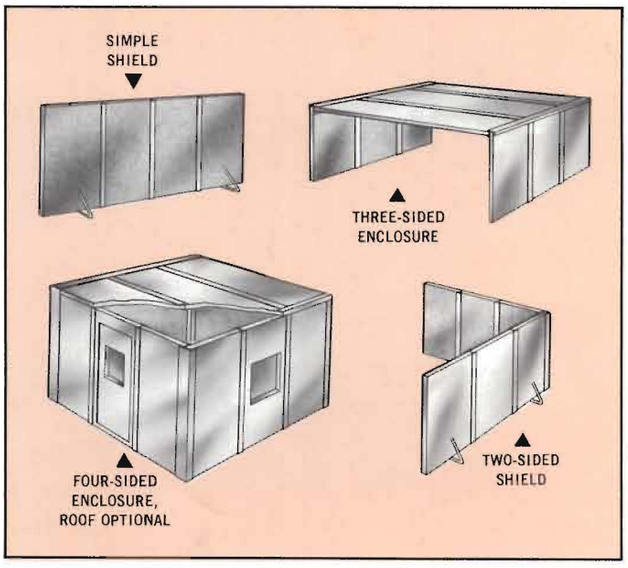
*Applies to Noishield Panels.

TYPICAL STRUCTURES ASSEMBLED OF IAC MODULINE PANELS



▲ Large Moduline® soundproof office on factory floor. No size limitations.

◀ Moduline® cut-off saw machinery enclosure reduces noise to levels below the Walsh-Healey criteria.



All designs and specifications subject to change without notice.

Call or write for Moduline Application Manual, Bulletin 6.0502.1, for detailed performance and design information.

iac THE STANDARD OF SILENCE

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AND ASSOCIATES, INC.
ACOUSTICAL CONSULTANTS
42-15 CRESCENT STREET. LONG ISLAND CITY. N. Y. 11101 TELEPHONE: 937-0990

1. INTRODUCTION

This report submits our findings concerning the acoustic tests conducted at Industrial Acoustics Company's Laboratory in a semi-reverberant environment described in Section 3. Test modules, without flooring, were erected on the concrete slab on grade with 4 inches air space between modules. All tests were supervised and witnessed by the undersigned.

The purposes of these tests were:

a. To determine Noise Reduction (NR) and Noise Isolation Class (NIC) rating for this product line in the following test configurations:

1. Out-In (semi-reverberant field to module).
2. In-Out (module to semi-reverberant field).
3. Room-to-Room (module to module) with 4 inches (100 mm) spacing between modules.

b. To establish the reverberation time of each module when varying the effective absorption of interior surfaces by means of "tuning" absorbers.

2. STANDARDS

NR measurements were made in accordance with the American Society for Testing and Materials (ASTM) Designation E 336-71, Standard Recommended Practice for the Measurements of Airborne Sound Insulation in Buildings, and with applicable portions of the ASTM Designation E 90-75, Standard Recommended Practice for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions. Noise Isolation Class (NIC), single number rating, was established according to ASTM Standard E 413-70T.

All microphone stations were always kept at 43 inches (1090 mm) off the floor (ear level of a sitting subject). When the module was used as a Source Room (in either "in-out" or "module-to-module" configuration), two highly powered flat spectrum sound systems were utilized and positioned in such a fashion as to create a uniform diffused sound field throughout the volume of the module. Extensive probing was performed, prior to testing in order to assure the omni-directional pattern of the sources and minimum variations of the sound field, thereby securing uniform illumination of all internal surfaces and in turn providing valid averaging throughout the volume. In the "out-in" test configuration, the sources were facing away from the module. The source sound field existing between the sources and the module was carefully probed. The space-average was used to establish the Source SPL.

Reverberation times were established by the Decay Rate Method. These measurements are very essential since both modules, without flooring, were erected directly on a cement slab. Furthermore, the interior of either module was designed as a mix of "hard" and "soft" (absorptive) panels. By placing the carpet on the floor and by adding strategically located Vari-Tone Plaques (sound absorbing units) on the wall modules could be "softened" as desired by varying the number of active plaques. This "tuning" of the modules allows a flexibility to create the most suitable environment for either a soloist or an ensemble (instrument or voice) by selecting the desired reverberation time to project the sound of specific quality, timbre, etc.

3. TEST ENVIRONMENT

Two test modules with 4 inches (100 mm) air spacing between them were installed directly, without flooring or isolation system, on the 12 inch (300 mm) thick concrete slab on grade. The large volume test room is best described in terms of the reverberation times measured by the Decay Rate Method at all test frequencies as listed in Table 1.

4. DESCRIPTION

The IAC Music Practice Rooms used in this test program were installed on a continuous concrete slab on grade without flooring or isolation system. One module was 130 inches (3300 mm) long by 84 inches (2135 mm) wide by 94 inches

TABLE 1 — Space-Average Reverberation Times in Seconds

1/3 OCTAVE BAND, Hz	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000
TIME, SEC.	0.39	0.40	0.49	0.62	0.56	0.57	0.69	0.68	0.75	0.74	0.73	0.84	0.72	0.83	0.95	0.91

TABLE 2 — Noise Reduction Data

CENTER FREQUENCY, Hz 1/3 OCTAVE BAND	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	NIC Rating
	NOISE REDUCTION, dB																
IN-OUT (Module to Semi-Reverberant Field)[a,c]	23	34	41	44	44	45	42	48	51	50	56	56	55	59	60	62	47
OUT-IN (Semi-Reverberant Field to Module)[b,c]	28	28	37	37	38	38	38	42	46	48	51	53	54	55	56	58	45

NOTE:
[a]NR data are plotted in Figure 1.
[b]NR data are plotted in Figure 2.
[c]No carpeting, no Vari-Tone Plaques in the module.

(2390 mm) high. All these measurements represent outside dimensions. Each module has a built-in air intake and exhaust ventilation panel which overhangs outside facing of the wall, which contained the ventilation panel by 2 inches (50 mm). Larger module weighed 3800 lb (1725 kg) while the smaller one weighed 3300 lb (1500 kg). Wall and ceiling panels were constructed of 16 gauge solid steel outer surface and 16 gauge solid or 22 gauge perforated interior surface. Perforations consisted of 3/32 inch (2.38 mm) holes on 3/16 inch (4.76 mm) staggered centers. Interior surfaces in both modules were designed to be a mix of "hard" (solid) and "soft" (perforated) panels. Specially designed Vari-Tone Plaques were individually hung on the interior walls. The architecture of the desired environment in each module could be, therefore, styled by varying the number of active plaques with respect to each other and with respect to additional inherent hard and soft interior facings. Panel surfaces were welded to a steel frame filled with sound absorbing and dampening elements to form a 4-inch (100 mm) thick panel. Ventilation panels were of solid 16 gauge steel surface on both sides of similar welded construction and contained a sound-absorbing silencer section resulting in a 6-inch (150 mm) panel thickness. One intake and one discharge silencer panel formed a portion of the walls of each room. The intake panel contained a supply fan. Ventilation systems were in complete operating condition during the entire test procedure.

Each module contained an out-swinging door with clear opening of 36 inches (900 mm) wide by 79½ inches (2000 mm) high. Each leaf contained a 27 inch (685 mm) wide by 74½ inch (1890 mm) high double glazed window. Each leaf was operating on two IAC cam-lift hinges. Double magnetic/absorptive seals were used in the jamb and head of door assemblies with compression seals at floor. Doors were in complete operating condition during test. Floors were carpeted with ¼ inch (6.35 mm) thick pile rug with foam backing. Each module was painted on interior and exterior surfaces.

TABLE 3 — Room-to-Room (Module-to-Module) NR Data with 4-in. (100 mm) Spacing Between Modules

CENTER FREQUENCY, Hz 1/3 OCTAVE BAND	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	NIC Rating
	RECEIVING ROOM — NOISE REDUCTION, dB																
CARPETED & 5 PLAQUES[a]	37	58	74	72	71	76	74	76	84	90	>91	>92	>92	>90	>90	>91	61
NO CARPET & 5 PLAQUES[b]	37	57	65	72	71	77	74	81	85	91	>89	>92	>90	>91	>90	>91	61
NO CARPET & NO PLAQUES[c]	36	58	63	70	68	74	72	79	83	84	>89	>92	>90	>91	>90	>91	60

NOTE:
[a]Carpeted and 5 plaques, NR data are plotted in Figure 3.
[b]No carpet and 5 plaques, NR data are plotted in Figure 4.
[c]No carpet and no plaques, NR data are plotted in Figure 5.

TABLE 4 — Reverberation Time of 440 cu. ft. (12.5 cu. m.) — 130 in. x 84 in. x 94 in. High Module

CENTER FREQUENCY, Hz OCTAVE BAND	63	125	250	500	1000	2000	4000
	REVERBERATION TIME, SECONDS						
CARPET, 5 PLAQUES	0.324	0.252	0.262	0.203	0.180	0.176	0.193
NO CARPET, 5 PLAQUES	0.330	0.264	0.350	0.236	0.223	0.220	0.225
NO CARPET, 3 PLAQUES	0.300	0.256	0.377	0.265	0.261	0.282	0.308
CARPET ONLY	0.368	0.373	0.405	0.376	0.482	0.519	0.488
NO CARPET, NO PLAQUES	0.345	0.361	0.508	0.658	0.733	0.747	0.664

TABLE 5 — Reverberation Time of 309 cu. ft. (8.8 cu. m.) — 92 in. x 84 in. x 94 in. High Module

CENTER FREQUENCY, Hz OCTAVE BAND	63	125	250	500	1000	2000	4000
	REVERBERATION TIME, SECONDS						
CARPETED, 2 PLAQUES	0.400	0.230	0.232	0.193	0.159	0.152	0.147
NO CARPET, 2 PLAQUES	0.402	0.236	0.240	0.214	0.176	0.167	0.174
CARPET ONLY	0.407	0.228	0.239	0.210	0.240	0.300	0.267
NO CARPET, NO PLAQUES	0.399	0.224	0.231	0.243	0.260	0.279	0.289

Witnessed and Certified by:

Fred Shen, P.E.
Cerami & Associates, Inc.

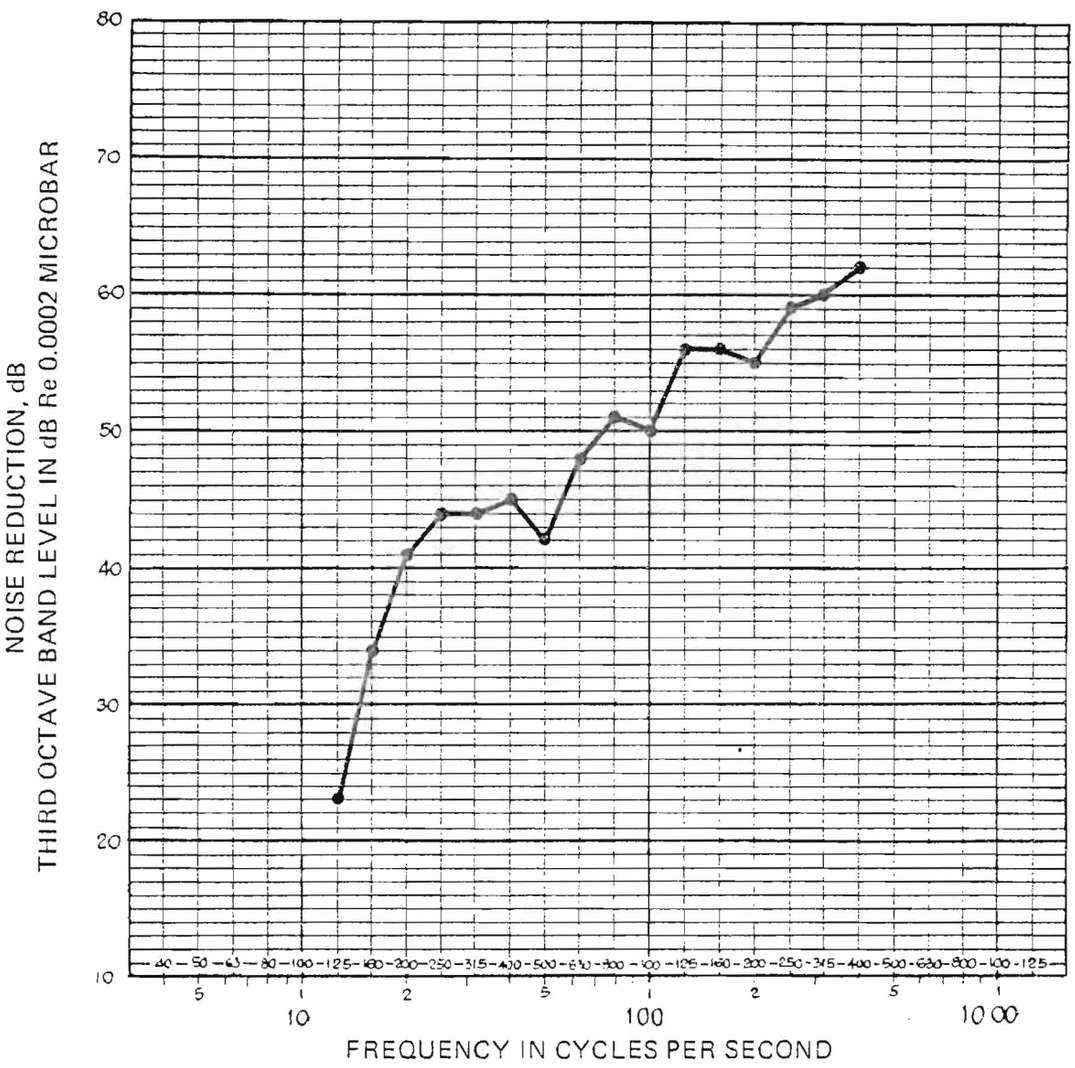
Cerami
AND ASSOCIATES, INC.

Cerami

AND ASSOCIATES, INC.
ACOUSTICAL CONSULTANTS

PROJECT IAC CONCERT SERIES MUSIC PRACTICE ROOMS*
Test No. 443-77

SHEET 3 OF 7
DATE Jan. 14, 19 77



NIC 47

IN–OUT (MODULE TO SEMI-REVERBERANT FIELD)
FIGURE 1

*Without floors

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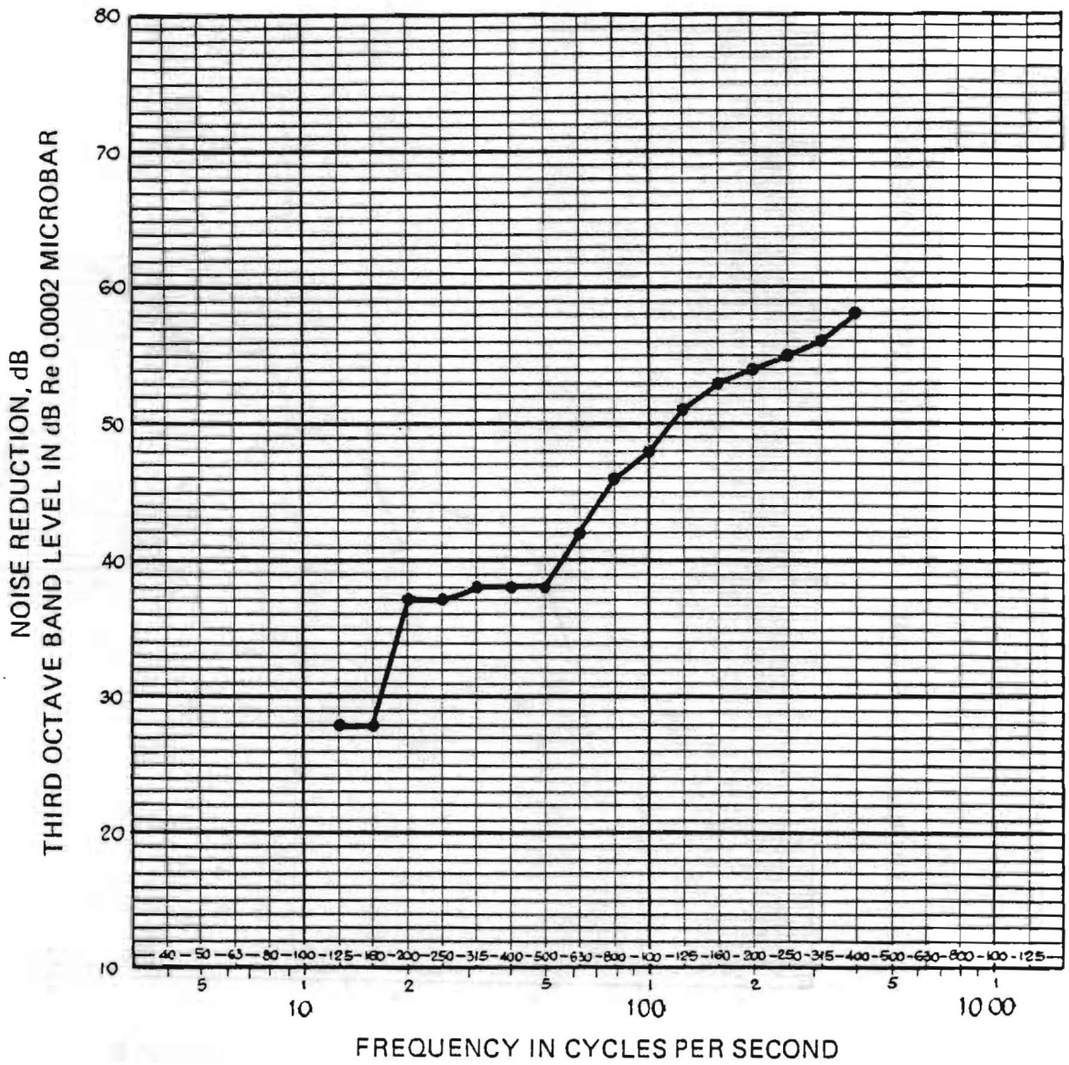
Test No. 443-77

SHEET 4 OF 7
DATE Jan. 14, 19 77



NIC 45

OUT–IN (SEMI-REVERBERANT FIELD TO MODULE)
FIGURE 2

*Without floors

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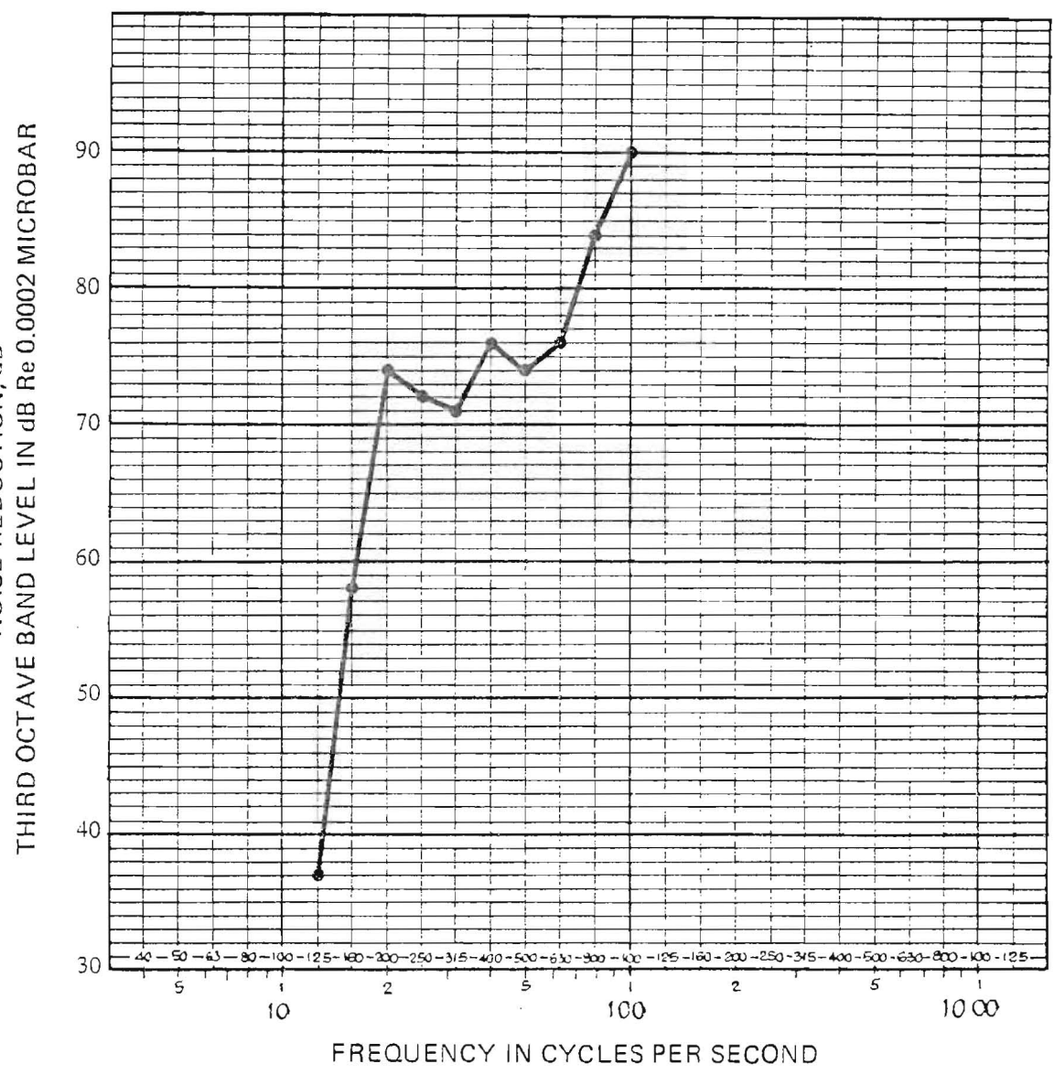
PROJECT IAC CONCERT SERIES MUSIC PRACTICE ROOMS *
Test No. 443-77

SHEET 5 OF 7
DATE Jan. 14 ,19 77



NIC 61

ROOM TO ROOM (MODULE TO MODULE)
RECEIVING ROOM CARPETED AND 5 PLAQUES
FIGURE 3

*Without floors

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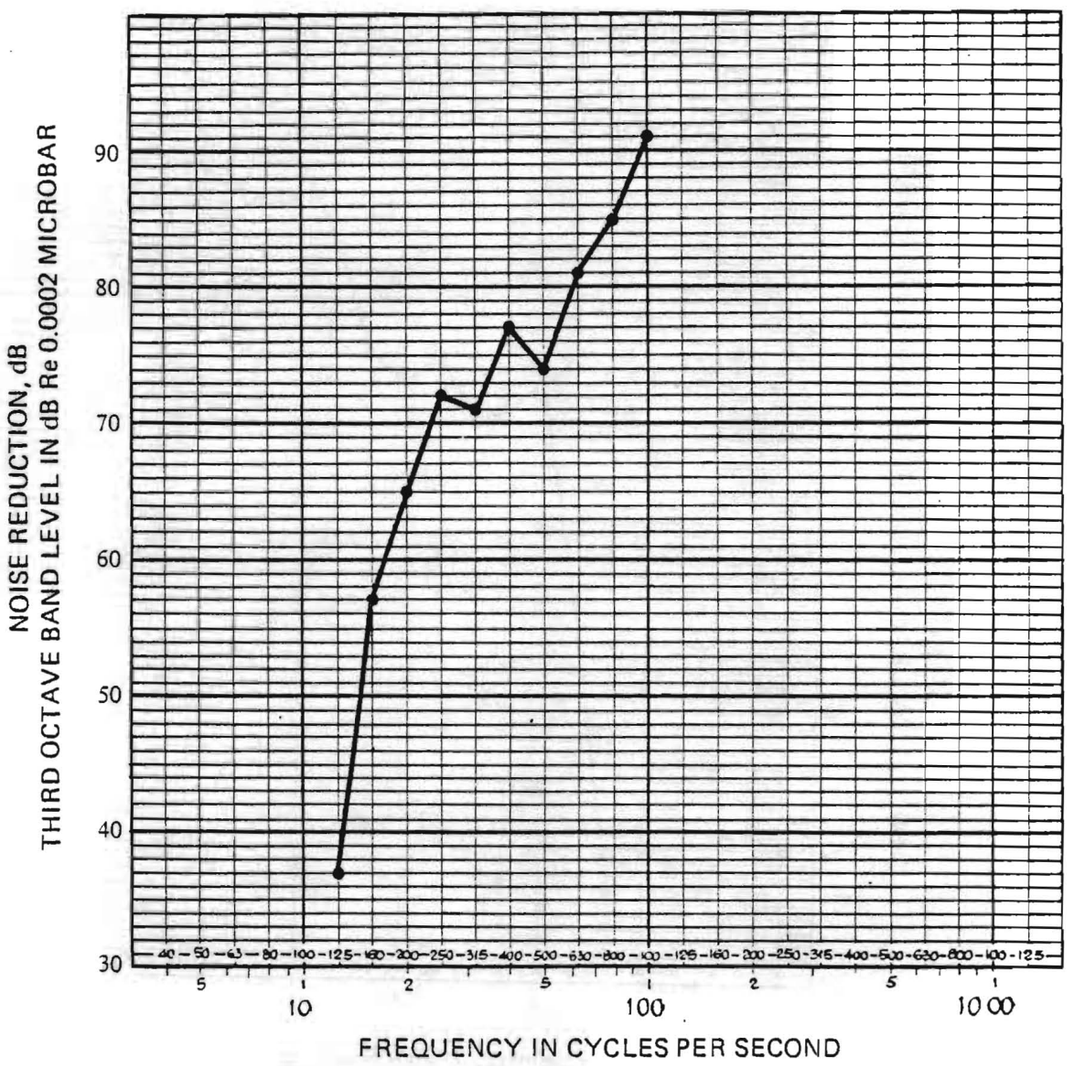
PROJECT IAC CONCERT SERIES MUSIC PRACTICE ROOMS*
Test No. 443-77

SHEET 6 OF 7
DATE Jan. 14, 19 77



NIC 61

ROOM TO ROOM (MODULE TO MODULE)
RECEIVING ROOM WITH NO CARPET AND 5 PLAQUES
FIGURE 4

*Without floors

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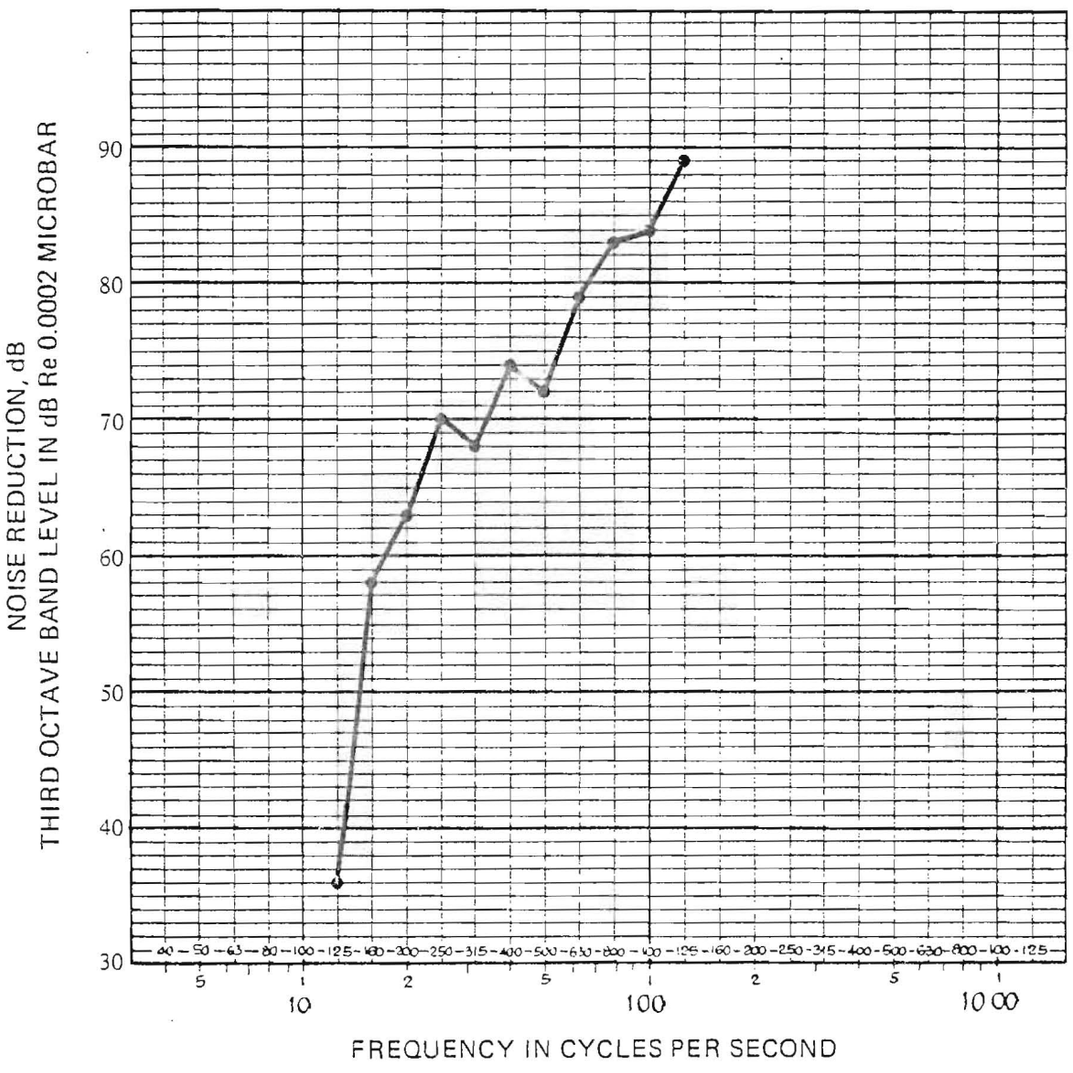
AND ASSOCIATES, INC.

ACOUSTICAL CONSULTANTS

PROJECT IAC CONCERT SERIES MUSIC PRACTICE ROOMS *
Test No. 443-77

SHEET 7 OF 7
DATE Jan. 14, 19 77



NIC 60

ROOM TO ROOM (MODULE TO MODULE)
RECEIVING ROOM WITH NO CARPET AND NO PLAQUES
FIGURE 5

*Without floors